



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

REGION 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

**MAY 11 2015**

REPLY TO THE ATTENTION OF:  
WU-16J

**CERTIFIED MAIL: 7009 1680 0000 7675 6136**  
**RETURN RECEIPT REQUESTED**

Mr. Theodore A. Pagano  
General Manager  
Michigan Potash Operating, LLC  
1225 17<sup>th</sup> Street, Suite 2200  
Denver, Colorado 80202

**Re: Permit Application for three Class I non-hazardous waste injection wells; U.S. Environmental Protection Agency, Underground Injection Control Permit Application #sMI-133-11-0004, 0005, 0006**

Dear Mr. Pagano:

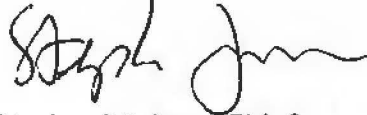
EPA received the Michigan Potash permit application for three Class I non-hazardous waste injection wells on January 16, 2015. EPA's technical review of the application discovered discrepancies and lack of information regarding the following areas of the applications: well construction, Plugging and Abandonment Plan, injection formation fracture gradient, friction loss, and construction of wells within the area of review.

In order to continue the technical review of the application, EPA is requesting additional information (enclosed) to clarify the specifics of this project and to determine compliance with the Underground Injection Control regulations. Under 40 C.F.R. Part 2 Subpart B, you may assert a business confidentiality claim only to the extent and by means of the procedures at 40 C.F.R. Part 2 Subpart B. You must make any request for confidentiality when you submit the information since any information not so identified may be made available to the public without further notice.

Michigan Potash, LLC must submit all requested information under an authorized signature as set out in 40 C.F.R. § 144.32(a)(1) or (2), as applicable, and using the certification language in 40 C.F.R. § 144.32(d). These regulations are enclosed for your reference. Any documents received by EPA in response to this request with signatures not consistent with the above cited regulations will not be considered in evaluating the permit application for the proposed wells.

Should you have any questions regarding this request, please call Allan Batka of my staff at (312) 353-7316 or email at [batka.allan@epa.gov](mailto:batka.allan@epa.gov).

Sincerely,

A handwritten signature in black ink, appearing to read "Steph Jann", with a stylized, flowing script.

Stephen M. Jann, Chief  
Underground Injection Control Branch

Enclosures

Cc: J. Dean Geers, Atwell

## **Information Request (May 2015)**

### **Michigan Potash, LLC, Permit Application #'s MI-133-11-0004, 0005, 0006**

1. Attachments F and Q, and EPA Form 7520-14 ("Plugging and Abandonment Plan page 2 diagram) of the permit application contain well construction diagrams that identify a 17 ½ inch hole and 13 3/8 inch casing for the construction of the surface casing for all three proposed wells. Attachment L, of the application, describes the construction procedures for the three wells and identifies a 13 ½ inch hole and 9 5/8 inch casing for the surface casing. Please identify consistent well dimensions on these Attachments and EPA form and identify any corrections to the cement calculation for cementing this casing to the surface.
2. The permit application for the three wells requests injection into the Reed City Dolomite, the Sylvania Sandstone, and the Bass Island Dolomite. Injection into the Sylvania Sandstone and the Bass Island Dolomite is identified through an open hole well construction. However, the permit application does not give detailed information on how the Reed City Dolomite will be accessed through all three wells. Attachment L.4 of the application generally identifies that the wells will be perforated and Attachment F.2 identifies that access to the Reed City Dolomite will only be made if the Sylvania Sandstone and Bass Island Dolomite will not accept fluid at the proposed volumes.

Please identify the detailed construction procedures for accessing the Reed City Dolomite through the three wells. This information should also identify that the Reed City will only be accessed if the Sylvania and Bass Island formations will not accept the proposed fluid volumes. Parts of the application that need to contain this information are the diagrams and descriptions in Attachments F, L, Q, and page 1 and 2 (for all three wells) of EPA Form 7520-14 "Plugging and Abandonment Plan". Please also note that the packer locations for each proposed well configuration (i.e., open hole and perforations) must be identified in the diagrams and descriptions identified above. EPA Region 5 requires that the packer be placed within 100 feet of the injection formation top.

3. The "Plugging and Abandonment Plan" (EPA Form 7520-14 page 1 and 2) did not contain the following information:
  - a. "Casing and Tubing Record After Plugging" (page 1 of EPA form). This section of the form must identify all proposed casing strings.
  - b. "Depth to Bottom of Tubing or Drill Pipe" (page 1 of EPA form). The bottom of the proposed plugs must be identified in this space.
  - c. "Measured Top of Plug" (page 1 of EPA form). Although the title identifies measure top of plug, an estimation of the plug tops must be entered in the space.
  - d. "List All Open Hole and/or Perforated Intervals . . ." (page 1 and 2 of EPA form). Open hole and perforated intervals must be identified.

Please submit revised Plugging and Abandonment Plans (EPA Form 7520-14, pages 1 and 2) for all three wells with an authorized signature as set out in 40 C.F.R. § 144.32(a)(1) or (2), as applicable.

4. Attachment H.2 of the permit application identifies that injection tests were made within the Reed City Dolomite. Results from these tests established a fracture gradient of 1.18 psi per foot and did not result in fracturing the tested formation. For EPA to consider this fracture gradient when calculating the maximum injection pressure for the proposed three wells, Michigan Potash must submit the test data referenced in Attachment H.2 of the application. A scaled map identifying Michigan Potash's three proposed injection wells and the well or wells used in the injection tests must also be submitted with the test results.
5. Attachment H.2 of the permit application identifies a calculated friction loss within the well of 38 psi. For EPA to consider this friction loss when calculating the maximum injection pressure within the three proposed injection wells, Michigan Potash must submit the well friction analysis that established the 38 psi pressure loss.
6. Attachment O of the permit application, "Plans For Well Failures", must include a statement that EPA will be contacted immediately upon the determination that mechanical integrity has been lost in any of the three proposed injection wells.
7. Attachment C of the application, "Corrective Action Plan and Well Data" identifies wells within the 2 mile area of review that penetrate the proposed injection formations. Construction and plugging documentation was not provided for the following wells:
  - a. Jensen 1-2, Permit # 37188
  - b. Pilarski 1-12, Permit #00340
  - c. Johnson 1-6, Permit #36067
  - d. Johnson 2-1, Permit #00377
  - e. Johnson 3-1, Permit #00337

Please submit the well construction and plugging documentation for these wells.

## § 144.32

## 40 CFR Ch. I (7–1–12 Edition)

(9) For EPA-administered programs, the applicant shall identify and submit on a list with the permit application the names and addresses of all owners of record of land within one-quarter mile of the facility boundary. This requirement may be waived by the Regional Administrator where the site is located in a populous area and the Regional Administrator determines that the requirement would be impracticable.

(10) A plugging and abandonment plan that meets the requirements of § 146.10 of this chapter and is acceptable to the Director.

(f) *Recordkeeping.* Applicants shall keep records of all data used to complete permit applications and any supplemental information submitted under § 144.31 for a period of at least 3 years from the date the application is signed.

(g) *Information Requirements for Class I Hazardous Waste Injection Wells Permits.* (1) The following information is required for each active Class I hazardous waste injection well at a facility seeking a UIC permit:

(i) Dates well was operated.

(ii) Specification of all wastes which have been injected in the well, if available.

(2) The owner or operator of any facility containing one or more active hazardous waste injection wells must submit all available information pertaining to any release of hazardous waste or constituents from any active hazardous waste injection well at the facility.

(3) The owner or operator of any facility containing one or more active Class I hazardous waste injection wells must conduct such preliminary site investigations as are necessary to determine whether a release is occurring, has occurred, or is likely to have occurred.

[48 FR 14189, Apr. 1, 1983, as amended at 49 FR 20185, May 11, 1984; 52 FR 45797, Dec. 1, 1987; 52 FR 46963, Dec. 10, 1987; 58 FR 63897, Dec. 3, 1993; 75 FR 77288, Dec. 10, 2010]

### § 144.32 Signatories to permit applications and reports.

(a) *Applications.* All permit applications, except those submitted for Class

II wells (see paragraph (b) of this section), shall be signed as follows:

(1) *For a corporation:* by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means; (i) A president, secretary, treasurer, or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding \$25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

NOTE: EPA does not require specific assignments or delegations of authority to responsible corporate officers identified in § 144.32(a)(1)(i). The Agency will presume that these responsible corporate officers have the requisite authority to sign permit applications unless the corporation has notified the Director to the contrary. Corporate procedures governing authority to sign permit applications may provide for assignment or delegation to applicable corporate positions under § 144.32(a)(1)(ii) rather than to specific individuals.

(2) *For a partnership or sole proprietorship:* by a general partner or the proprietor, respectively; or

(3) *For a municipality, State, Federal, or other public agency:* by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes: (i) The chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

(b) *Reports.* All reports required by permits, other information requested by the Director, and all permit applications submitted for Class II wells under § 144.31 shall be signed by a person described in paragraph (a) of this section, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in paragraph (a) of this section;

## Environmental Protection Agency

## § 144.34

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, or position of equivalent responsibility. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and

(3) The written authorization is submitted to the Director.

(c) *Changes to authorization.* If an authorization under paragraph (b) of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph (b) of this section must be submitted to the Director prior to or together with any reports, information, or applications to be signed by an authorized representative.

(d) *Certification.* Any person signing a document under paragraph (a) or (b) of this section shall make the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

(Clean Water Act (33 U.S.C. 1251 *et seq.*), Safe Drinking Water Act (42 U.S.C. 300f *et seq.*), Clean Air Act (42 U.S.C. 7401 *et seq.*), Resource Conservation and Recovery Act (42 U.S.C. 6901 *et seq.*)

[48 FR 14189, Apr. 1, 1983, as amended at 48 FR 39621, Sept. 1, 1983]

### § 144.33 Area permits.

(a) The Director may issue a permit on an area basis, rather than for each well individually, provided that the permit is for injection wells:

(1) Described and identified by location in permit application(s) if they are existing wells, except that the Director

may accept a single description of wells with substantially the same characteristics;

(2) Within the same well field, facility site, reservoir, project, or similar unit in the same State;

(3) Operated by a single owner or operator; and

(4) Used to inject other than hazardous waste; and

(5) Other than Class VI wells.

(b) Area permits shall specify:

(1) The area within which underground injections are authorized, and

(2) The requirements for construction, monitoring, reporting, operation, and abandonment, for all wells authorized by the permit.

(c) The area permit may authorize the permittee to construct and operate, convert, or plug and abandon wells within the permit area provided:

(1) The permittee notifies the Director at such time as the permit requires;

(2) The additional well satisfies the criteria in paragraph (a) of this section and meets the requirements specified in the permit under paragraph (b) of this section; and

(3) The cumulative effects of drilling and operation of additional injection wells are considered by the Director during evaluation of the area permit application and are acceptable to the Director.

(d) If the Director determines that any well constructed pursuant to paragraph (c) of this section does not satisfy any of the requirements of paragraphs (c) (1) and (2) of this section the Director may modify the permit under § 144.39, terminate under § 144.40, or take enforcement action. If the Director determines that cumulative effects are unacceptable, the permit may be modified under § 144.39.

[48 FR 14189, Apr. 1, 1983, as amended at 75 FR 77288, Dec. 10, 2010]

### § 144.34 Emergency permits.

(a) *Coverage.* Notwithstanding any other provision of this part or part 124, the Director may temporarily permit a specific underground injection if:

(1) An imminent and substantial endangerment to the health of persons will result unless a temporary emergency permit is granted; or

# MICHIGAN POTASH OPERATING, LLC

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May 22nd, 2015

Mr. Steven M. Jann  
Chief, UIC Branch (WU-16J)  
US EPA Region 5  
77 W. Jackson Blvd.  
Chicago, IL 60604-3590

VIA: Priority Tracking, USPS

Re: CLASS I NON HAZARDOUS APPLICATION No. MI-133-11-0004,0005,0006  
OSCEOLA AND MECOSTA COUNTY, MICHIGAN  
*INFORMATION REQUEST (MAY 2015)*

Dear Mr. Jann:

In response to your Letter dated, May 11<sup>TH</sup> 2015, please find enclosed, respectfully submitted for your review, our first response to your inquiry concerning the above reference UIC application.

If you have any questions or require any additional information, please feel free to contact me directly at 970 590 3944.

Sincerely yours,



Theodore Pagano, P.E., P.G.  
General Manager  
Michigan Potash Operating, LLC  
[tpagano@mipotash.com](mailto:tpagano@mipotash.com)

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**OPERATOR RESPONSE TO EPA REGION V REQUEST  
FOR ADDITIONAL INFORMATION, CLASS I NON HAZARDOUS PERMIT APPLICATION  
NOS: MI-133-1I-0004,0005,0006  
MAY 2015**

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**EPA REQUEST, PARAGRAPH 1.**

- 1.1 Clarify the surface hole size.
- 1.2 Clarify the surface casing size.
- 1.3 Correct the cement calculation for cementing the casing to surface.
- 1.4 Amended and corrected attachments reflecting 1.1-1.3.
  - Amended ATTACHEMENT F, Figures F14.
  - Amended ATTACHEMENT L
  - Amended ATTACHEMENT M

**EPA REQUEST, PARAGRAPH 2.**

- 2.1 Identify the detailed construction procedures for accessing the Reed City Dolomite. This information should also identify that the Reed City will only be accessed if the Sylvania and Bass Island formations will not accept the proposed fluid volumes. Also clarify contingent Packer location provided the Reed City Dolomite is accessed.
- 2.2 Amend and/or replace the Attachments F, L, Q and EPA Form 7520-14 to be consistent with the requested information showing access to the Reed City Dolomite.
  - Amended ATTACHEMENT Q
  - Amended EPA FORM 7520-14

**EPA REQUEST, PARAGRAPH 3.**

- 3.1 Amend and/or replace “Plugging and Abandonment Plan” (EPA Form 7520-14).

**EPA REQUEST, PARAGRAPH 4.**

- 4.1 Submit injection test data for the Reed City Dolomite.
  - Excerpts, 2006 RE-APPLICATION for MI-133-1I-0001 (the Woodward 1-26) and MI-133-1I-0002 (the Thomas 1-26) permit criteria
  - Excerpts, Operating Conditions, for MI-133-1I-0001, MI-133-1I-0002
- 4.2 Submit a scaled map identifying Michigan Potash’s three proposed injection wells and the well or wells used in the injection tests.
  - AMENDED ATTACHEMENT H.2. FIGURE H.2, Scaled Map
  - FIGURE B2.
- 4.3 Other applicable information.



EPA REQUEST, PARAGRAPH 5.

5.1 Submit the well friction analysis that established the 38 psi pressure loss.

EPA REQUEST, PARAGRAPH 6.

6.1 Amend Attachment O.

EPA REQUEST, PARAGRAPH 7.

7.1 Submit the well construction and plugging documentation for the

- a. Jensen 1-2, Permit # 37188
- b. Pilarski 1-12, Permit #00340
- c. Johnson 1-6, Permit #36067
- d. Johnson 2-1, Permit #00377
- e. Johnson 3-1, Permit #00337

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**OPERATOR RESPONSE TO EPA REGION V REQUEST  
FOR ADDITIONAL INFORMATION, CLASS I NON HAZARDOUS PERMIT APPLICATION  
NOS: MI-133-11-0004,0005,0006  
MAY 2015**

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EPA request for Additional Information (May 2015):

1. Attachments F and Q, and EPA Form 7520-14 ("Plugging and Abandonment Plan page 2 diagram) of the permit application contain well construction diagrams that identify a 17 1/2 inch hole and 13 3/8 inch casing for the construction of the surface casing for all three proposed wells. Attachment L, of the application, describes the construction procedures for the three wells and identifies a 13 3/8 inch hole and 9 5/8 inch casing for the surface casing. Please identify consistent well dimensions on these Attachments and EPA form and identify any corrections to the cement calculation for cementing this casing to the surface.
- 

**1.1. Clarify the Surface Hole Size**

The Surface hole size will be 13 3/8 inch.

**1.2. Clarify the Surface Casing Size**

The Surface casing size will be 9 5/8 inch.

**1.3. Correct the Cement Calculation for cementing the casing to surface.**

Cement will be brought to surface.

Provided :

- 1) the annular volume between 9 5/8 inch casing and 13 3/8 inch open hole is 0.4705 cubic ft/ft, and
- 2) cement yield will approximate 1.47, and
- 3) surface casing will be set at 800'; and
- 4) excess at 20%; then

the correct number of sacks of cement will approximate 320.

**1.4. Amend and/or replace the Attachments to be consistent.**

Please find immediately following this page:

- 1) amended ATTACHMENT F, Figure F14 for MPC 1D, MPC 2D, and MPC 3D showing the correct surface hole, surface casing size, and correct number of sacks of cement, and
- 2) amended ATTACHMENT L, and
- 3) amended ATTACHMENT M.1, re-written to reflect consistency.

# **MPC 1D (AMENDED MAY 2015)**

SURFACE: NW/4 SEC 31, T17N R08W, 43.825947, -85.323008

VERTICAL WELL

OSCEOLA COUNTY, MI

## **PROPOSED WELLBORE DIAGRAM**

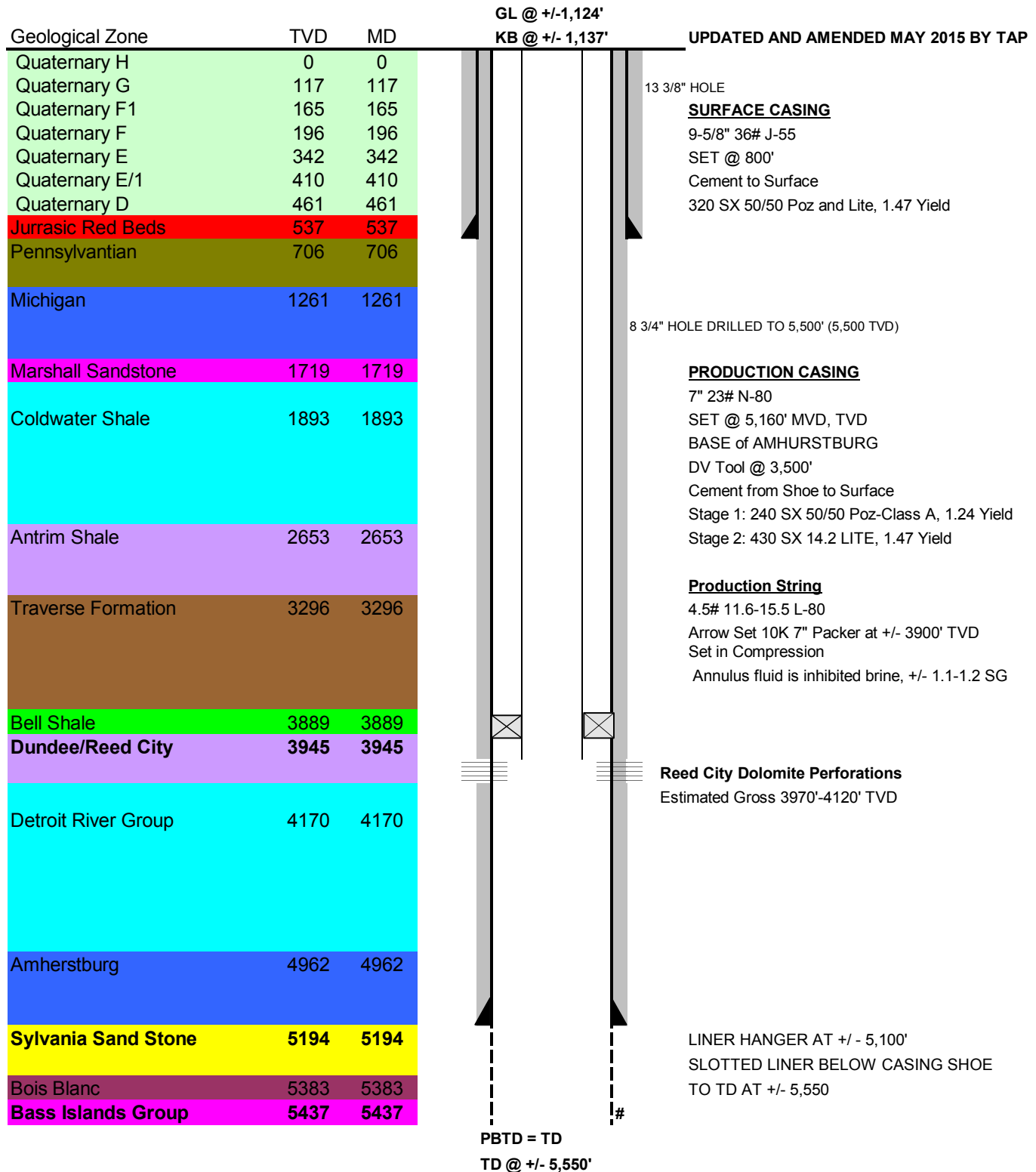


FIGURE F14.

**MPC 2D (AS AMENDED MAY 2015)**

SURFACE: NW/4 SEC 31, T17N R08W, 43.825948, -85.322932

BOTTOM: SW/4 SEC 30, T17N R08W, 43.832871, -85.322873

OSCEOLA COUNTY, MI

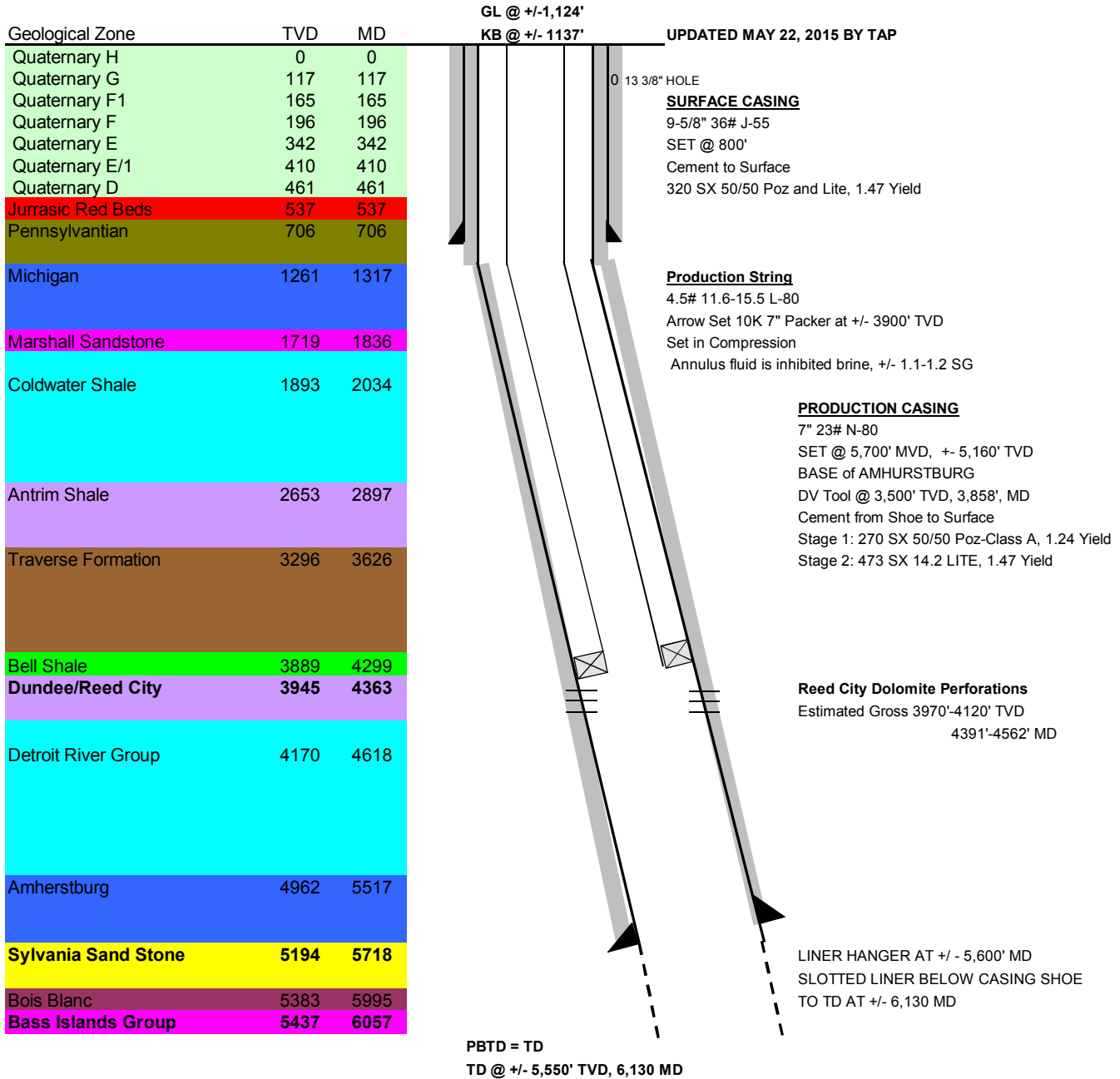
**PROPOSED WELLBORE DIAGRAM**

FIGURE F14.

# MPC 3D (AMENDED MAY 2015)

SURFACE: NE/4 SEC 36, T17N R09W, 43.818448, - 85.326073

VERTICAL WELL

OSCEOLA COUNTY, MI

## PROPOSED WELLBORE DIAGRAM

GL @ +/-1,190'

KB @ +/- 2003'

UPDATED MAY 22ND 2015 BY TAP

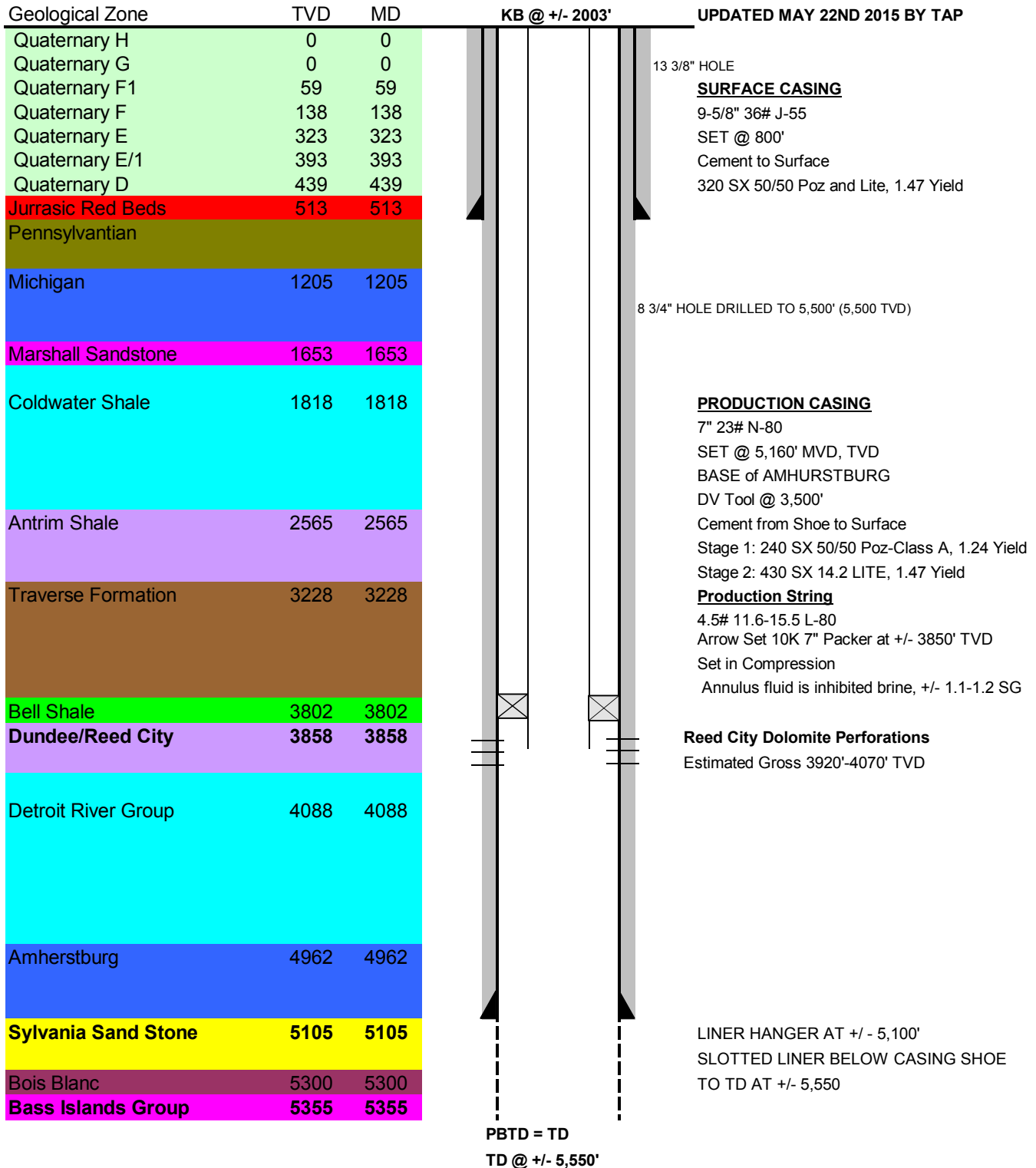


FIGURE F14.



**US EPA UIC PERMIT APPLICATION FORM 7520-6**  
***NON HAZARDOUS***  
**CLASS I**

**ATTACHMENT L: CONSTRUCTION PROCEDURES**  
**ATTACHEMENT AMENDED MAY 22<sup>ND</sup>, 2015**

**IN RESPONSE TO REQUEST FOR ADDITIONAL**  
**INFORMATION MAY 11TH, 2015**

**THE UNITED STATES POTASH PROJECT**  
**JANUARY 2015**

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**ATTACHEMENT L.**  
**CONSTRUCTION PROCEDURES (AS AMENDED MAY 22<sup>ND</sup> 2015) IN RESPONSE TO EPA**  
**REQUEST FOR ADDITIONAL INFORMATION MAY 11<sup>TH</sup>, 2015.**

EPA instruction, form 7520-6 (2011):

**CONSTRUCTION PROCEDURES** -Discuss the construction procedures (according to §146.12 for Class I, §146.22 for Class II, and §146.32 for Class III) to be utilized. This should include details of the casing and cementing program, logging procedures, deviation checks, and the drilling, testing and coring program, and proposed annulus fluid. (Request and submission of justifying data must be made to use an alternative to packer for Class I.)

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**L.1 Detailed well construction procedures**  
**Proposed Mud Program**

**Surface Hole (0' – 800' +/-):** The surface hole drilling fluid will consist of an 8.4 - 9.0 ppg fresh water spud mud formulation with 28-36 viscosity units with fluid loss control as necessary to reach the base of the glacial till. Limit total solids to 4-6%.

**Production Hole (800'+/- to TD 5,550'):** The production hole drilling fluid will consist of a 9.0 – 9.6+ ppg water based mud system with 40-50 viscosity units and less than 25 fluid loss units. At +/- 4080, a low water loss system should be used to TD.

**Drill Stem Tests**

A DST in the Reed City Dolomite and  
A DST in the Sylvania Sandstone and  
A DST in the Bass Island Group.

**Deviation Checks**

Every 750' of drill depth a deviation survey shall be performed. More frequently if the deviation angle goes beyond the planned allowance.

**Open Hole Logs**

Surface Casing: Resistivity, Spontaneous Potential, Caliper and GR.

Production Casing: Resistivity, Spontaneous Potential, Neutron Density, Compensated Formation Density, Gamma Ray, Caliper, Photo-Electric Effect, Multi-pad Micro Resistivity (i.e. Dip-meter-Fracture Finder), Borehole volume analysis

**Cased Hole Logs**

Surface Casing: cement bond log, variable density log with collar locator, and temperature log

Production Casing: A state of the art, cement bond log variable density log, and collar locator will be run from total depth to surface. The depth of the casing is checked using a collar locator log to locate the marker joint. Before any injection commences, a baseline temperature log will also be run, so that comparative analysis can be performed following the commencement of injection.

## **Detailed Drilling Procedure**

The proposed injection wells will be drilled and cased according to the following detailed construction procedure:

1. Line locate. Prepare footprint.
2. Provide 24 hour notice of move in rig up to all regional, State, and Federal authorities.
3. Report expected SPUD.
4. Permit will be on location at all times.
5. Drive 16" conductor to 100'.
6. Move in Rig Up Drilling Unit.
7. Drill rat hole and mouse hole.
8. Notify all regional, State and Federal authorities with SPUD report.
9. Mix fresh water mud and with 40-50 funnel viscosity and 8.4-9.0 lb/gal weight, or as dictated.
10. Initiate surface drilling with 13 3/8" rock bit. Catch samples from 0-600', every 50' and bag.
11. At 800' KB, Trip out of hole while standing back. Run open-hole logs. Pick up and run in hole with 9 5/8" 36# K-55 STC casing. +/- 7 centralizers installed midway on every second joint. Weld bottom joints. Set and Cement according to cement design. Expect +/- 20 bbl MUD FLUSH, 320 SX 50/50 Poz Premium and Lite, 1.47 Yield, designed with 20% Excess.
12. Bump plug and wait on cement.
13. Nipple up 9 5/8" casing spool. Nipple up 3000# hydraulic annular preventer, 5K Blow out preventer, pipe over blinds, and choke manifold. Test.
14. Pick up 8 3/4" Tri-Cone Rock bit, crows foot (pump through check plug), 12 x 6 1/4" drill collars, change over, drill pipe (Portions of bottom hole assembly subject to design change). Trip into plug and trip out while standing back. Run cased hole logs for surface casing.
15. Inspect and test pipe rams. Move in rig up Service Mud.
16. Trip in hole with bottom hole assembly and drill through surface shoe and test.
17. At the appropriate depth as determined by mud logging, Move in rig up testers. Trip out of hole while standing back.
18. Pick up drill stem testing tool and run in hole. Drill stem test the proposed injection horizons, 60 minute flow-120 minute shut-60 minute flow-90 minute shut. Catch fluid samples and analyze. Rig down move out testers.
19. Proceed to drill to 5,550' Total Vertical Depth, Total Depth will be +/- 5,500', which is across all injection horizons.
20. At Total Depth, pull off bottom 1 stand and circulate. Make long short trip.
21. Condition well for Open Hole Logs.
22. Trip out of hole while laying down drill pipe and Bottom hole assembly.
23. Mover in rig up wireline service. Run open hole suite. Rig down move out wireline service.
24. Move in rig up casing crew. Pick up and Run in hole with 7" guide shoe, short joint, 7" float collar, 7" x 5.5" liner hanger, 7" 29#-23# N-80 or equivalent API grade LTC production casing to surface. Run centralizers every other joint from Total Depth to +/- 3000' True Vertical Depth. Weld bottom 5 Joints. Run DV Tool at +/- 3500,' so as to bring cement to surface.
25. Move in rig up cement services.
26. Haul in biocide treated fresh water for cement displacement.
27. Cement the production casing as per the design proposal while reciprocating.  
Stage 1: 20 SX Mud flush, 240 SX 50/50 Poz Premium-Class A Premium, 1.24 Yield, designed



with 20% Excess. Work Casing and Open DV tool, Stage 2: 430 SX 14.2 LITE Premium, 1.47 Yield, designed with 20% Excess Stage 2 Top of cement: Surface.

32. Drop the plug and displace cement.
31. Rig down move out casing crew. Rig down move out cement services.
32. Set casing cap.
33. Rig down move out Drilling Unit.

#### Completion

34. Set rig anchors. Move in rig up service unit. Spot power swivel and rig tank. Nipple up blow out preventer, pipe over blinds.
35. Pick up 6 3/4" blade bit, cross over and 2 7/8" 6.4# tubing. Pick up power swivel. Drill out the DV tool and run to Total depth.
36. At Total depth, spot and wash and displace 1,000 gallons of dilute HCl as per stimulation procedure. Trip out of hole while standing back. Lay down drill bit.
37. Mover in rig up wireline. If necessary, Pick up and Run in hole with wireline set, tubing retrievable bridge plug. Set above liner hanger. Fill hole with fluid.
38. Run Cement bond log, variable density log, casing collar locator log.
37. Pick up straddle packer and Run in hole to Open Hole. Pump additional HCl as per stimulation procedure.
38. Run formation parting test and injection test as follows:
  - a. Install a calibrated 3,000 psi pressure gauge and recorder on the discharge line of the pump.
  - b. Pump water into well at a slow rate and obtain a stabilized injection pressure. Record rates, pressures, and time duration of entire test,
  - c. Increase injection rate slightly and keep pumping until a stabilized pressure is obtained. Continue this incremental pumping until formation parting is recognized. At that time, the rate of injection will increase rapidly with a slight increase in pressure.
  - d. Plot data and determine formation parting pressure.
  - e. After establishing the parting of formation, run three or more injection tests at different stabilized rates and pressures below the parting pressure.
39. Conduct pressure fall-off test. After injection test is completed, shut well in and record the pressure until a stabilized pressure is obtained, or pressure drops below zero gauge pressure. If it is below zero gauge pressure, measure the fluid level. If test results prove unsatisfactory, additional stimulation may be done to improve the effective permeability at the well bore. This may include additional acid treatment.
40. Pick up and repeat 36-39 over the Sylvania Sandstone.
41. Trip out of hole while standing back. Pick up slotted liner and run in hole and land.
42. Trip out of hole while laying down 2 7/8" tubing.
43. Pick up 4.5" 10' tailpipe, Seating nipple, change over, 7" 10K Arrowset full bore packer, 10' pup joint, Seating nipple, 4.5" 11.6# tubing and Run in hole to +/- 5090' KB.

44. Displace casing fluid with annulus fluid.
45. Set packer in compression.
46. Test casing and packer seal.
47. Nipple down blow out preventer. Nipple up 7" 5K x 4.5" wellhead.
47. Rig down move out service unit.

Please refer to Figure F14 for a well schematic of the proposed injection well.

48. Establish Injection sustained injection rate for the Bass Island Dolomite and Sylvania Sandstone.

Contingent or completion detail accessing the Reed City Dolomite:

49. In the event that the Bass Island Dolomite and Sylvania Sandstone do not receive adequate disposal volumes, move in rig up service unit.
50. Nipple down wellhead. Nipple up blow out preventer and stripping rubber.
51. Release 10K Arrowset packer and trip out of hole while standing back.
52. Move in rig up wire-line perforating services. Run in hole and run gamma-ray, casing collar locator. Perforate the Reed City Dolomite at net footage as determined via the openhole log at the highest indicated neutron density and cleanest photo-electric indication, as per the following approximate gross footage (for each of the proposed wells), subject to open hole confirmation:

For the MPC 1D and MPC 2D

<b>Formation</b>	<b>Gross Top TVD</b>	<b>Gross Btm TVD</b>	<b>SPF</b>	<b>Phase</b>	<b>EHD</b>	<b>Pen</b>	<b>Net</b>	<b>Gross</b>
<b>Reed City Dolomite</b>	3970	4120	2	120D	.44	40"	TBD	150'

For the MPC 3D

<b>Formation</b>	<b>Gross Top TVD</b>	<b>Gross Btm TVD</b>	<b>SPF</b>	<b>Phase</b>	<b>EHD</b>	<b>Pen</b>	<b>Net</b>	<b>Gross</b>
<b>Reed City Dolomite</b>	3920	4070	2	120D	.44	40"	TBD	150'

53. Rig down move out wireline. Trip in hole with retrievable bridge plug and packer. Set retrievable bridge plug at +/- 5050 TVD, but above the liner hanger.
54. Pull up hole and set 10K arrowset packer. Spot 1000 gallons 15% Hcl into perforations to establish communication.
55. Run formation parting test and injection test as follows:
  - a. Install a calibrated 3,000 psi pressure gauge and recorder on the discharge line of the pump.
  - b. Pump water into well at a slow rate and obtain a stabilized injection pressure. Record rates, pressures, and time duration of entire test,

- c. Increase injection rate slightly and keep pumping until a stabilized pressure is obtained. Continue this incremental pumping until formation parting is recognized. At that time, the rate of injection will increase rapidly with a slight increase in pressure.
  - d. Plot data and determine formation parting pressure.
  - e. After establishing the parting of formation, run three or more injection tests at different stabilized rates and pressures below the parting pressure.
56. Conduct pressure fall-off test. After injection test is completed, shut well in and record the pressure until a stabilized pressure is obtained, or pressure drops below zero gauge pressure. If it is below zero gauge pressure, measure the fluid level. If test results prove unsatisfactory, additional stimulation may be done to improve the effective permeability at the well bore. This may include additional acid treatment.
57. Establish injection rate into the Reed City Dolomite. Release Packer. Release retrieve bridge plug.
58. Round trip and set packer at +/- 3900', which will be within 50' of the top perforation of the Reed City Dolomite.

## **L.2 Timetable for drilling, logging and formation testing**

Anticipated timing for drilling is permit dependent.

Drill time, following spud, will approximate 12 days for drilling and casing, 3 days for formation testing for fluid recovery, and 1 day for open hole logging. This is a total anticipated time of sixteen days per well.

## **L.3 Open hole and cased hole logs**

As per Section L.1, re-stated here.

### Open Hole

Surface Casing: Resistivity, Spontaneous Potential, Caliper and GR.

Production Casing: Resistivity, Spontaneous Potential, Neutron Density, Compensated Formation Density, Gamma Ray, Caliper, Photo-Electric Effect, Multi-pad Micro Resistivity (i.e. Dip-meter-Fracture Finder), Borehole volume analysis

### Cased Hole

Surface Casing: cement bond log, variable density log with collar locator, and temperature log

Production Casing: A state of the art, cement bond log variable density log, and collar locator will be run from total depth to surface. The depth of the casing is checked using a collar locator log to locate the marker joint. Before any injection commences, a baseline temperature log will also be run, so that comparative analysis can be performed following the commencement of injection.

**L.4 Mechanical integrity testing (cement bond logs, radioactive tracer log, and temperature, noise or oxygen activation log are required)**

All required logs will be run at before any perforations are added to the casing and before fluid injection commences.

The mechanical integrity of all the proposed injection wells will be tested according to the requirements of 40 CFR 146.8 to demonstrate that (1) there are no significant leaks in the casing, tubing, or packer and (2) there is no significant fluid movement into a USDW through vertical channels adjacent to the injection wellbores. As required by permit, mechanical integrity tests shall be conducted at the required frequency, and especially before any injection commences. The timing of these test shall be dictated according to pro-active best practice.

Required tests include:

- 1) an approved pressure test in accordance with 40 CFR 146.8(b)(1) [annually];
- 2) an approved radioactive tracer survey [every five years]; and
- 3) an approved temperature, noise, oxygen activation or other approved log [every five years];

or 1,2, & 3 above as otherwise directed by permit.

Gauges used in performance of the MIT will be calibrated to an accuracy of not less than 0.5 percent of fullscale prior to field use. A copy of the calibration certificate will be submitted to USEPA each time the gauge is calibrated.

Notice will be made to the USEPA and the MDEQ at least thirty days prior to the date of the schedule MIT. Tests must be witnessed by a representative of the USEPA and/or MDEQ. A written report of the results of the MIT will be made to the USEPA within 45 days following completion of the MIT.

**L.5 Buffer fluid and volume, if any**

Initially, the annular space between the injection tubing and casing in the injection wells will be displaced with a quantity of inhibited brine.



**US EPA UIC PERMIT APPLICATION FORM 7520-6**

***NON HAZARDOUS***

**CLASS I**

**ATTACHMENT M: CONSTRUCTION DETAILS  
ATTACHEMENT AMENDED MAY 22<sup>ND</sup>, 2015**

**IN RESPONSE TO REQUEST FOR ADDITIONAL  
INFORMATION MAY 11TH, 2015**

**THE UNITED STATES POTASH PROJECT  
JANUARY 2015**

---

**ATTACHEMENT M.  
CONSTRUCTION DETAILS**

EPA instruction, form 7520-6 (2011):

**CONSTRUCTION DETAILS** - Submit schematic or other appropriate drawings of the surface and subsurface construction details of the well.

---

The following information should be included in well schematics and/or tables, Cement volumes will be slightly greater for the MPC 2D, whereby, the calculated cement volumes for the MPC 2D can be referenced on the proposed wellbore diagram, Figure 14:

**M.1 Construction of well, including total depth, completion type, casing sizes, types, weights, and setting depths**

**Casing and Cement Design**

Casing	Hole Size	Casing OD	Weight	Grade	Thread	Set at
Conductor	20"	16"	65#	H-40	STC	100'
Surface	13 3/8"	9 5/8"	36"	J-55	STC	800'

Cemented With = 320 SX 50/50 Poz and Lite, 1.47 Yield, designed with 20% Excess  
To Estimated TOC = Surface

Casing	Hole Size	Casing OD	Weight	Grade	Thread	Set at
Production	8 3/4"	7"	23#, 26#, 29#	J-55,L-80	LTC	5,160'
DV Tool		7"				3,500
Slotted Liner	8 3/4"	5.5"				5,550'

Cemented With = Stage 1: 240 SX 50/50 Poz-Class A, 1.24 Yield, designed with 20% Excess  
Stage 1 TOC: 3,500'  
Stage 2: 430 SX 14.2 LITE, 1.47 Yield, designed with 20% Excess  
Stage 2 TOC: Surface

**M.2 Cement type and amount for all casing**

Please refer to Section M.1 and to Figure L.1-1.

**M.3 Tubing and packer specifications, including size, type, and setting depths**

Tubing Size 4-1/2 inch  
Tubing Type J-55, LT&C  
Coating TK69 epoxy  
Tubing Weight 11.6#/ft  
Packer Arrowset 10K set at 5090', tail pipe to 5,100'

#### M.4 Wellhead construction details

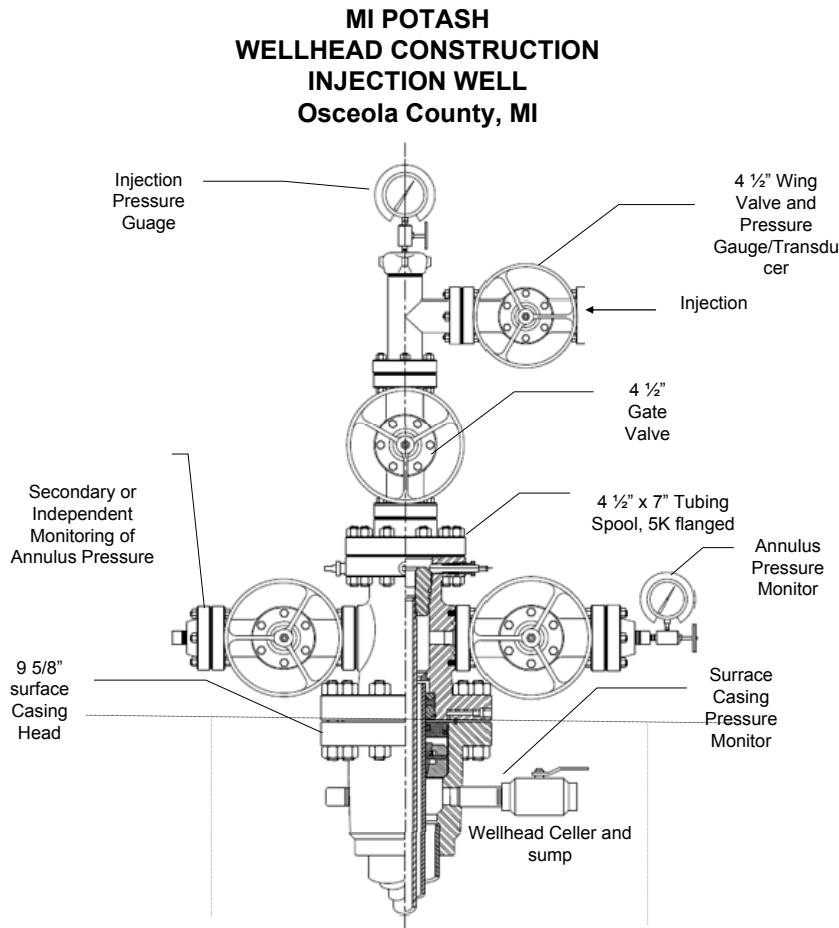


FIGURE M1.

#### Well Area

The well head will be surrounded by a concrete and steel sump. This sump will drain by gravity through a pipeline into a sump within the test mining facility processing building, where any leakage will be captured by a sump pump and re-injected into the circulating fluid system.

#### M.5 Location of sample tap and female coupling for independent determination of annulus pressure

Please refer top Figure M1.

EPA request for Additional Information (May 2015):

2. The permit application for the three wells requests injection into the Reed City Dolomite, the Sylvania Sandstone, and the Bass Island Dolomite. Injection into the Sylvania Sandstone and the Bass Island Dolomite is identified through an open hole well construction. However, the permit application does not give detailed information on how the Reed City Dolomite will be accessed through all three wells. Attachment L.4 of the application generally identifies that the wells will be perforated and Attachment F.2 identifies that access to the Reed City Dolomite will only be made if the Sylvania Sandstone and Bass Island Dolomite will not accept fluid at the proposed volumes.

Please identify the detailed construction procedures for accessing the Reed City Dolomite through the three wells. This information should also identify that the Reed City will only be accessed if the Sylvania and Bass Island formations will not accept the proposed fluid volumes. Parts of the application that need to contain this information are the diagrams and descriptions in Attachments F, L, Q, and page 1 and 2 (for all three wells) of EPA Form 7520-14 "Plugging and Abandonment Plan". Please also note that the packer locations for each proposed well configuration (i.e., open hole and perforations) must be identified in the diagrams and descriptions identified above. EPA Region 5 requires that the packer be placed within 100 feet of the injection formation top.

---

**2.1 Identify the detailed construction procedures for accessing the Reed City Dolomite. This information should also identify that the Reed City will only be accessed if the Sylvania and Bass Island formations will not accept the proposed fluid volumes. Also clarify contingent Packer location provided the Reed City Dolomite is accessed.**

Please see amended ATTACHEMENT L (Part 1.4), for detailed construction procedures on how the Reed City Dolomite will be accessed.

In Summary,

The Reed City Dolomite will be accessed via perforations, in the event the Bass Island Dolomite and Sylvania Sandstone do not accept fluid at the proposed volumes as per F.2, as referenced above.

Perforations will be selected based on open hole logging results, and therefore are currently reported as gross estimated depths in the injection interval. A projected gross perforated interval will be similar at all three wells, true vertical depth, and are reflected in *Amended Attachment F, Figure F14* for all three wells.

The packer will be set within 50' of the top of the Reed City Dolomite perforations.



**2.2 Amend and/or replace the Attachments F, L, Q and EPA Form 7520-14 to be consistent with the requested information showing access to the Reed City Dolomite.**

Please see the referenced Amended ATTACHEMENTS made a part of Section 1.0 and 2.0, that clarifies the requested information, specifically as it pertains to the access and proper plugging and abandonment of the Reed City Dolomite:

- 1) amended figures to ATTACHMENT F, (Part 1.4), corrected wellbore diagrams, showing access to the Reed City Dolomite
- 2) amended ATTACHMENT L, (Part 1.4), corrected well construction details, including detail as it concerns access to the Reed City Dolomite
- 3) amended figures to ATTACHMENT Q, corrected wellbore diagrams, and plugged wellbore diagrams, showing the Reed City Dolomite as perforated and plugged, and
- 4) amended EPA Form 7520-14, showing the Reed City Dolomite as perforated and plugged.

The material procedures and projected cement volumes for abandonment will not change, since cement must be brought to surface in the production casing; and therefore, the cost to abandon is not affected.

# **MPC 1D (AMENDED MAY 2015)**

SURFACE: NW/4 SEC 31, T17N R08W, 43.825947, -85.323008

VERTICAL WELL

OSCEOLA COUNTY, MI

## **PROPOSED WELLBORE DIAGRAM**

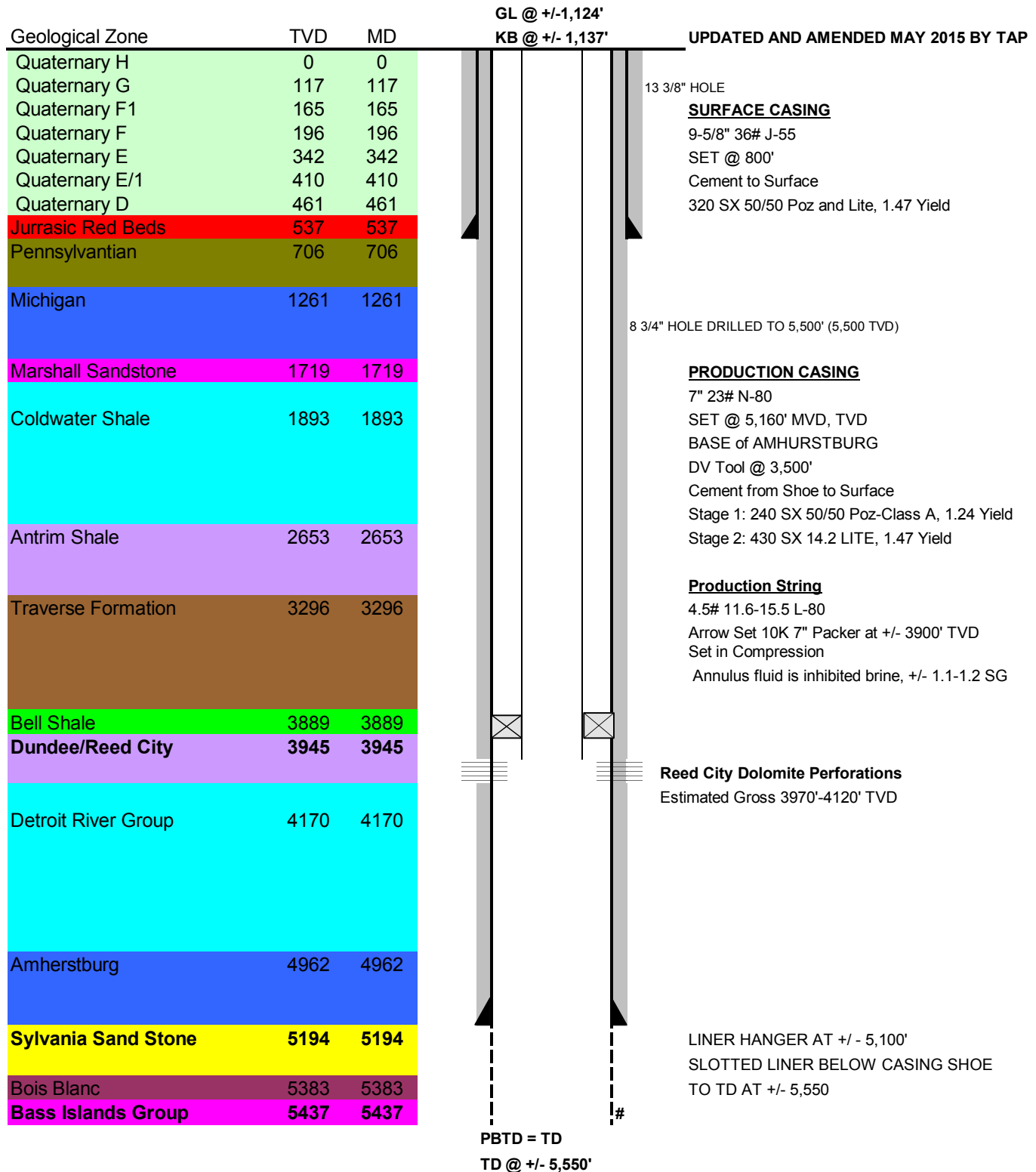


FIGURE F14.

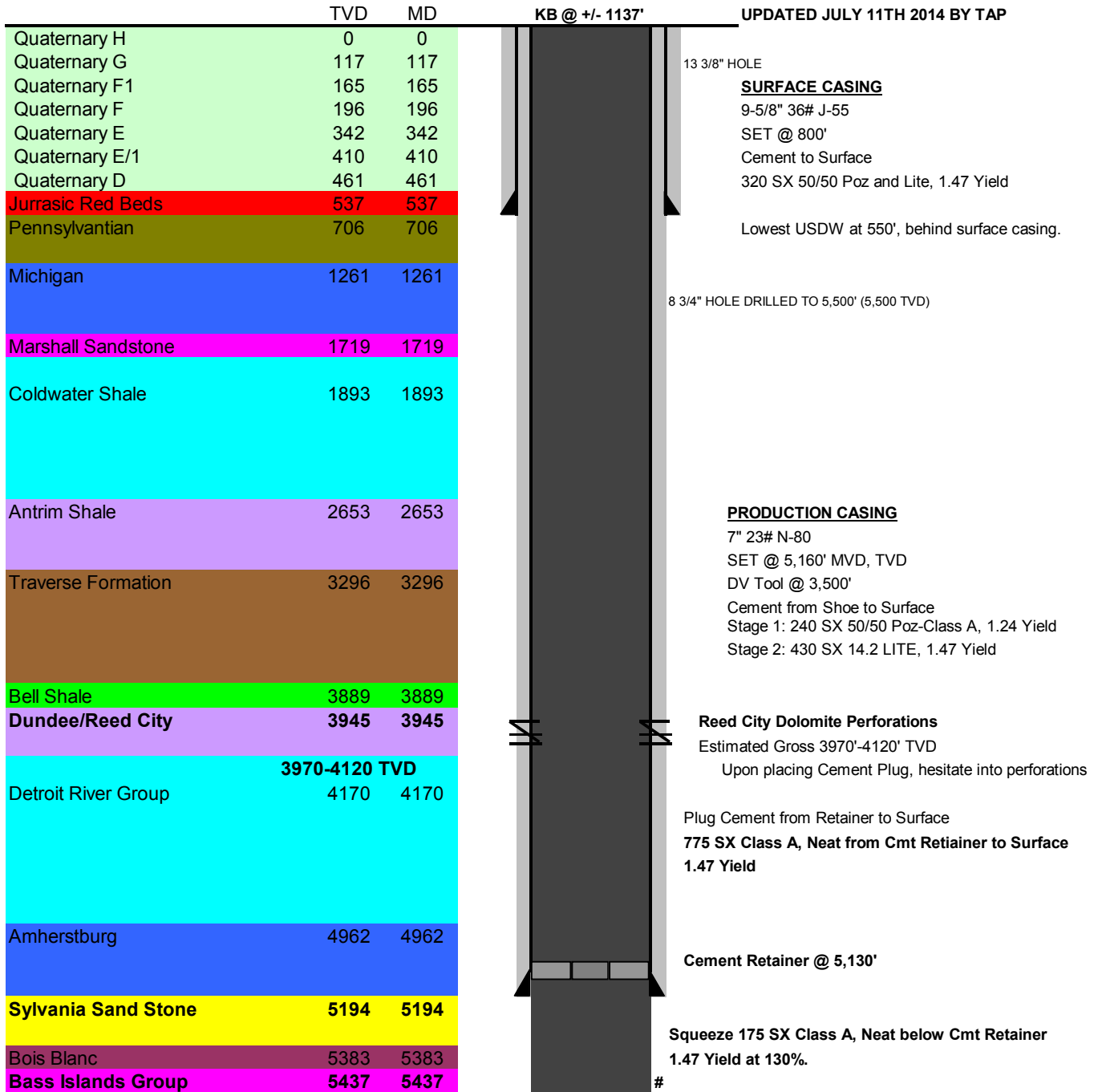
**MPC 1D (AMENDED MAY 2015)**  
**SURFACE: NW/4 SEC 31, T17N R08W, 43.825947, -85.323008**

**VERTICAL WELL**  
**OSCEOLA COUNTY, MI**  
**P & A WELLBORE DIAGRAM**

GL @ +/-1,124'

KB @ +/- 1137'

UPDATED JULY 11TH 2014 BY TAP



PBTD = TD

TD @ +/- 5,550'

Figure 14. P & A

**MPC 2D (AS AMENDED MAY 2015)**

SURFACE: NW/4 SEC 31, T17N R08W, 43.825948, -85.322932

BOTTOM: SW/4 SEC 30, T17N R08W, 43.832871, -85.322873

OSCEOLA COUNTY, MI

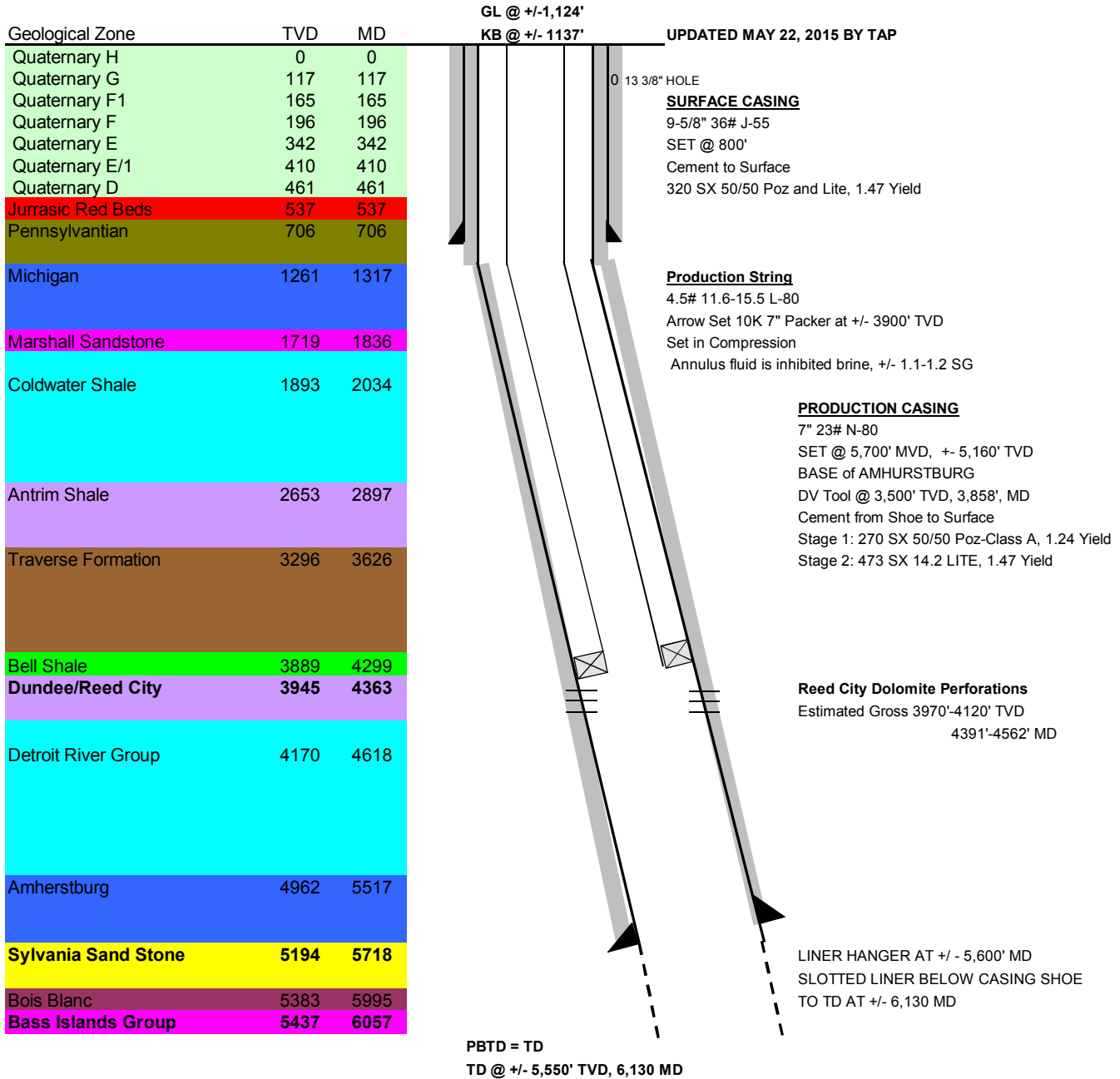
**PROPOSED WELLBORE DIAGRAM**

FIGURE F14.

**MPC 2D (AS AMENDED MAY 2015)**

SURFACE: NW/4 SEC 31, T17N R08W, 43.825948, -85.322932

BOTTOM: SW/4 SEC 30, T17N R08W, 43.832871, -85.322873

OSCEOLA COUNTY, MI

**PLUGGED WELLBORE DIAGRAM**

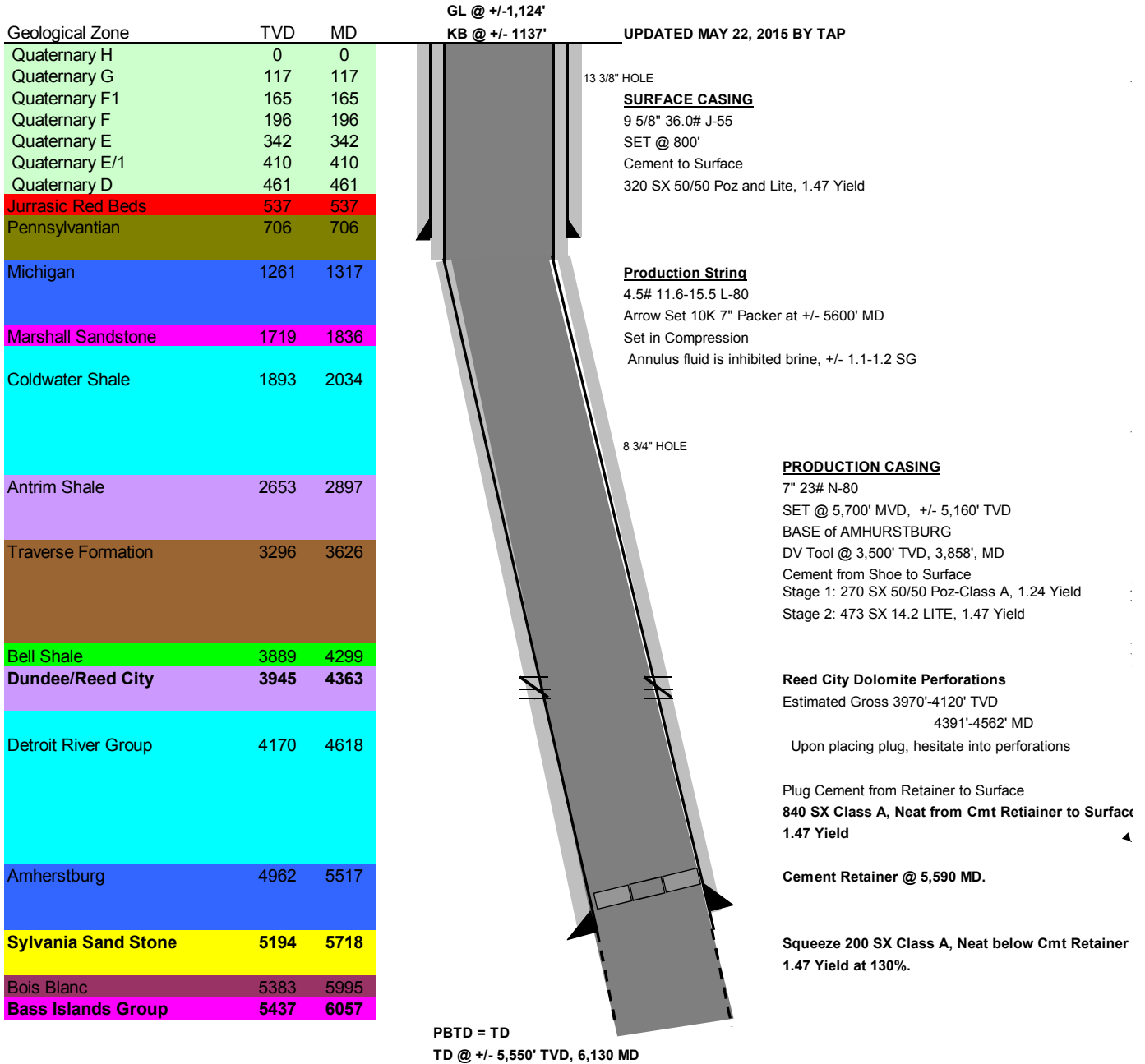


FIGURE F14. P & A.

# MPC 3D (AMENDED MAY 2015)

SURFACE: NE/4 SEC 36, T17N R09W, 43.818448, - 85.326073

VERTICAL WELL

OSCEOLA COUNTY, MI

## PROPOSED WELLBORE DIAGRAM

GL @ +/-1,190'

KB @ +/- 2003'

UPDATED MAY 22ND 2015 BY TAP

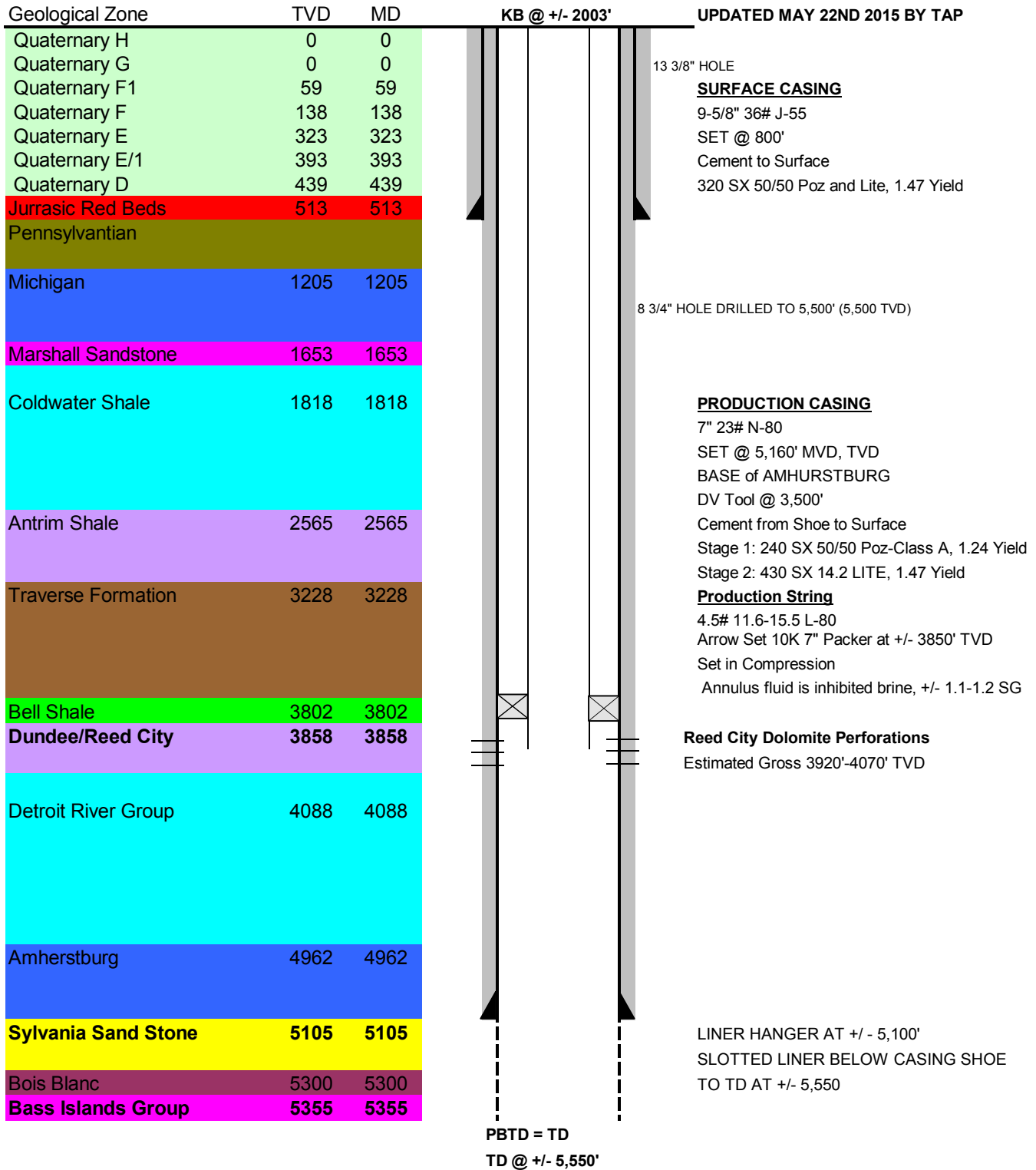


FIGURE F14.

**MPC 3D**  
**SURFACE: NE/4 SEC 36, T17N R09W, 43.818448, - 85.326073**  
**VERTICAL WELL**  
**OSCEOLA COUNTY, MI**

**PLUGGED WELLBORE DIAGRAM**

GL @ +/-1,190'

KB @ +/- 2003'

UPDATED MAY 22ND 2015 BY TAP

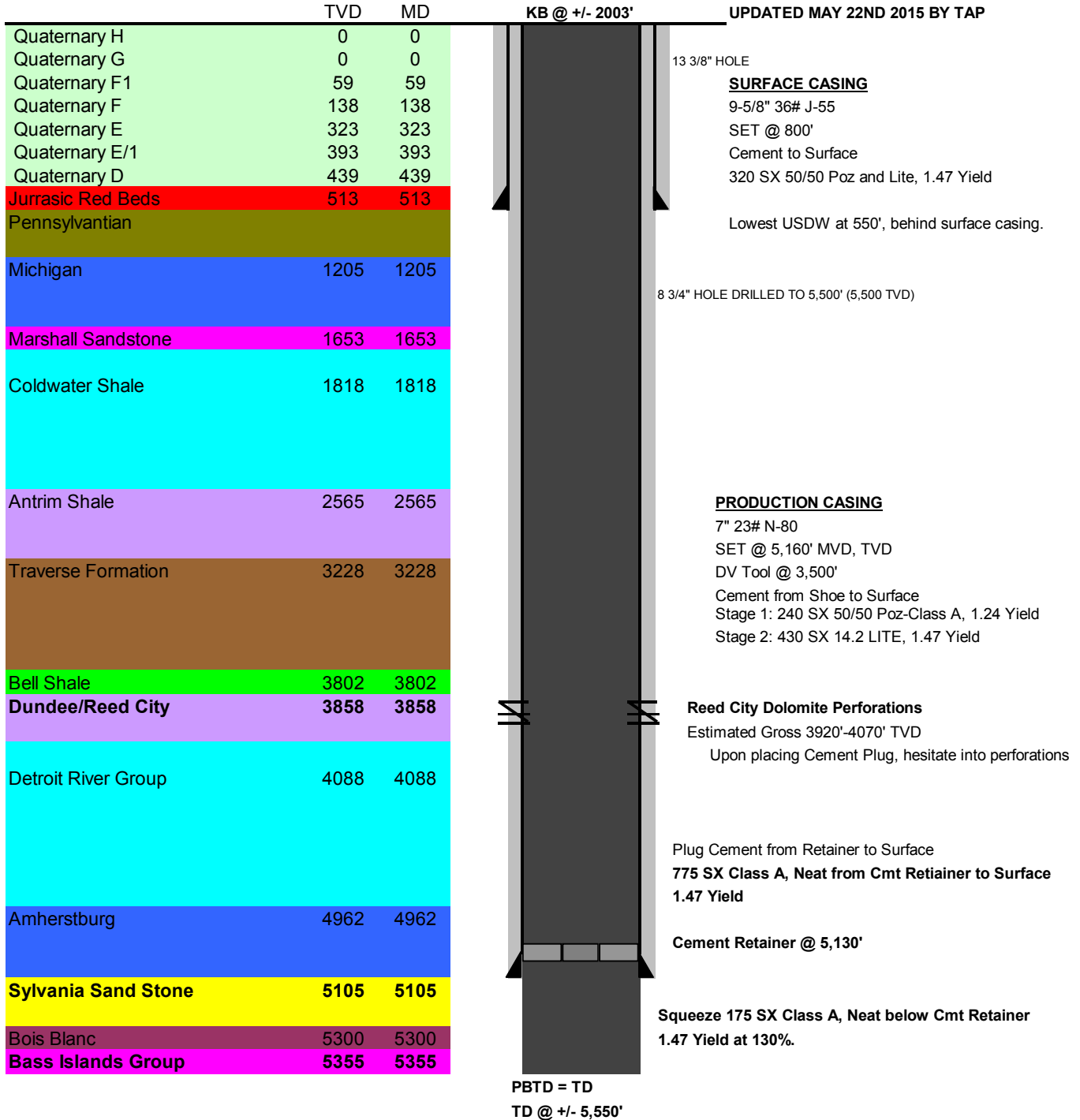


Figure 14. P & A



United States Environmental Protection Agency  
Washington, DC 20460

## PLUGGING AND ABANDONMENT PLAN

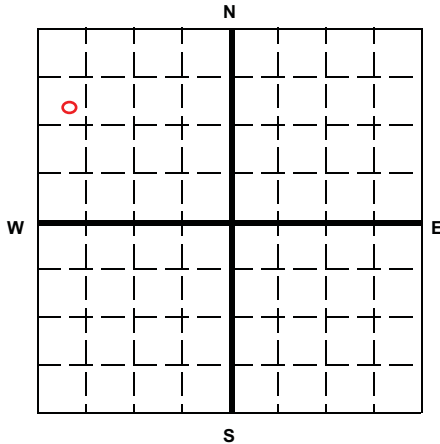
Name and Address of Facility

MPC 1D

Name and Address of Owner/Operator

Michigan Potash Operating, LLC c/o Fox Rothschild  
1225 17th Street, Suite 2200, Denver, CO 80215

Locate Well and Outline Unit on  
Section Plat - 640 Acres



State

Michigan

County

Osceola

Permit Number

Surface Location Description

SE 1/4 of SW 1/4 of NW 1/4 of NW 1/4 of Section 31 Township 17 Range 8

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface

Location  ft. frm (N/S) N Line of quarter section 1051' FRM N  
and  ft. from (E/W) W Line of quarter section. 376' FRM W

TYPE OF AUTHORIZATION

- ☒ Individual Permit  
☐ Area Permit  
☐ Rule

Number of Wells

WELL ACTIVITY

- ☒ CLASS I  
☐ CLASS II  
☒ Brine Disposal  
☐ Enhanced Recovery  
☐ Hydrocarbon Storage  
☐ CLASS III

Lease Name

Well Number MPC 1D

### CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT (LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE
9 5/8	36	800	800	13 3/8
7	23-28	5160	5160	8 3/4

### METHOD OF EMPLACEMENT OF CEMENT PLUGS

- ☐ The Balance Method  
☐ The Dump Bailer Method  
☐ The Two-Plug Method  
☒ Other

### CEMENTING TO PLUG AND ABANDON DATA:

	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (inches)	8 3/4"	7"					
Depth to Bottom of Tubing or Drill Pipe (ft BOTTOM OF PLUG (S))	5500	5130					
Sacks of Cement To Be Used (each plug)	155	775					
Slurry Volume To Be Pumped (cu. ft.)	228	1140					
Calculated Top of Plug (ft.)	5130	0					
Measured Top of Plug (if tagged ft.)	5130	0					
Slurry Wt. (Lb./Gal.)	14.2	14.2					
Type Cement or Other Material (Class III)	A	A					

### LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED (if any)

From	To	From	To
5160 Open hole	5550 Open Hole		
3970 Reed City Perfs (Est.Gross)	4120 Reed City Perfs (Est.Gross)		

Estimated Cost to Plug Wells

\$ 30,400

### Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

Name and Official Title (Please type or print)

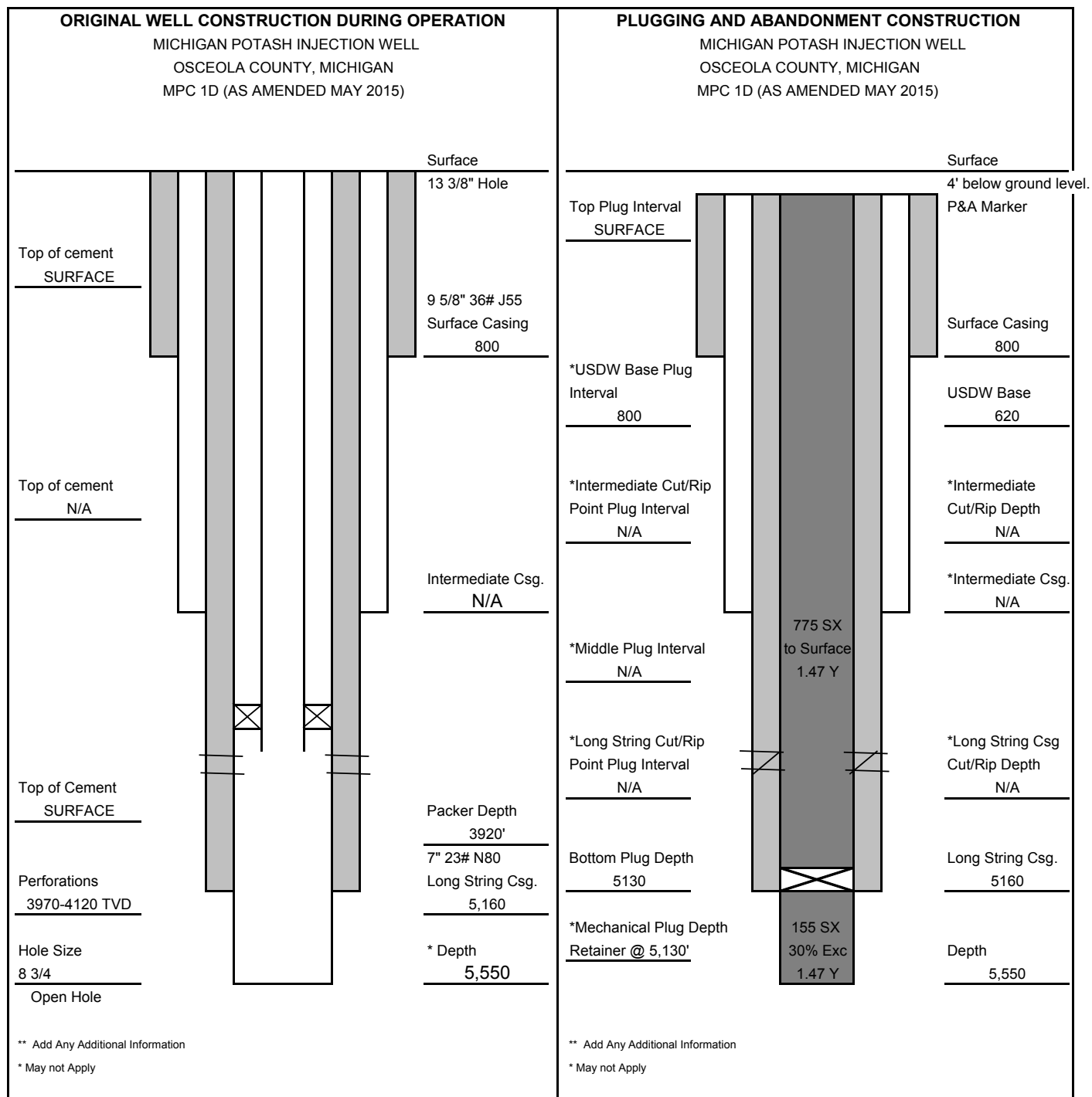
Theodore A. Pagano, P.E., P.G., General Manager

Signature

Date Signed

05/22/2014





**LIST OF ALL OPEN AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED**

Specify Open Hole/ Perforations/ Varied Casing	From	To	Formation Name
9 5/8" 36# Surface Casing	0	800	Surface
7" 23# Production Casing	0	5160	Production
Perforations	3970	4120	Reed City Dolomite (Estimated Gross)
OPEN HOLE	5160	5500	Bass Island Dolomite, Sylvania Sand



United States Environmental Protection Agency  
Washington, DC 20460

## PLUGGING AND ABANDONMENT PLAN

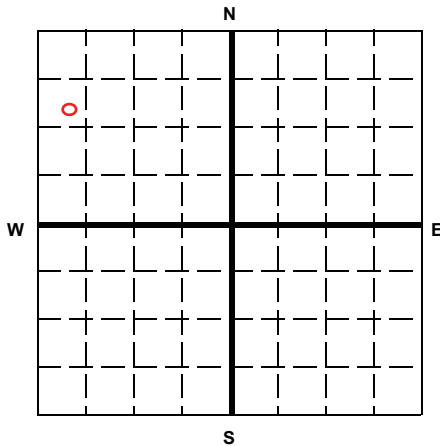
Name and Address of Facility

MPC 2D

Name and Address of Owner/Operator

Michigan Potash Operating, LLC c/o Fox Rothschild  
1225 17th Street, Suite 2200, Denver, CO 80215

Locate Well and Outline Unit on  
Section Plat - 640 Acres



State

Michigan

County

Osceola

Permit Number

Surface Location Description

SE 1/4 of SW 1/4 of NW 1/4 of NW 1/4 of Section 31 Township 17 Range 8

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface

Location  ft. from (N/S) N Line of quarter section 1050' FRM N  
and  ft. from (E/W) W Line of quarter section. 396' FRM W

TYPE OF AUTHORIZATION

- ☒ Individual Permit  
☐ Area Permit  
☐ Rule

Number of Wells

WELL ACTIVITY

- ☒ CLASS I  
☐ CLASS II  
☒ Brine Disposal  
☐ Enhanced Recovery  
☐ Hydrocarbon Storage  
☐ CLASS III

Lease Name

Well Number

MPC 2D

### CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT (LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE
9 5/8	36	800	800	13 3/8
7	23-28	5700	5700	8 3/4

### METHOD OF EMPLACEMENT OF CEMENT PLUGS

- ☐ The Balance Method  
☐ The Dump Bailer Method  
☐ The Two-Plug Method  
☒ Other

### CEMENTING TO PLUG AND ABANDON DATA:

	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (inches)	8 3/4"	7"					
Depth to Bottom of Tubing or Drill Pipe (ft) bottom of plug	5700	5590					
Sacks of Cement To Be Used (each plug)	160.00	1030					
Slurry Volume To Be Pumped (cu. ft.)	233.00	1511.00					
Calculated Top of Plug (ft.)	5590	0					
Measured Top of Plug (if tagged ft.)	5590	0					
Slurry Wt. (Lb./Gal.)	14.2	14.2					
Type Cement or Other Material (Class III)	A	A					

### LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED (if any)

From	To	From	To
5185 TVD, 5700 MD open hole	5550 TVD, 6130 MD open hole		
3970 TVD, 4391 MD RC* Perfs	4120 TVD, 4562 MD RC* Perfs		
*RC=Reed City Dolomite			

Estimated Cost to Plug Wells

\$ 30,400

### Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

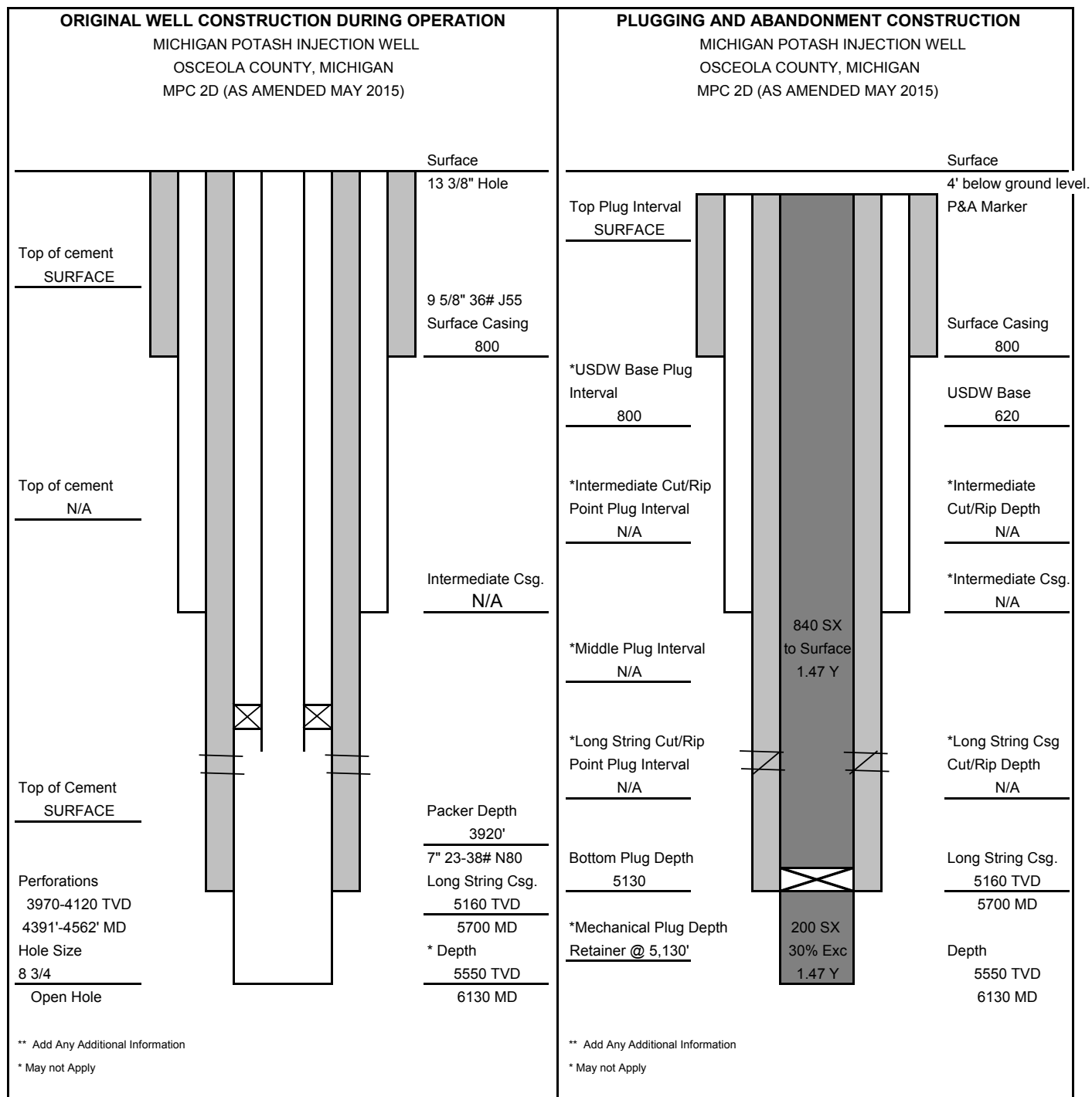
Name and Official Title (Please type or print)

Theodore A. Pagano, P.E., P.G., General Manager

Signature

Date Signed

05/22/2015



LIST OF ALL OPEN AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED			
Specify Open Hole/ Perforations/ Varied Casing	From	To	Formation Name
9 5/8" 36# Surface Casing	0	800	Surface
7" 23# Production Casing, MD	0	5700	Production
Perforations, MD	4391	4562	Reed City Dolomite (Estimated Gross)
OPEN HOLE, MD	6700	6130	Bass Island Dolomite, Sylvania Sand



United States Environmental Protection Agency  
Washington, DC 20460

## PLUGGING AND ABANDONMENT PLAN

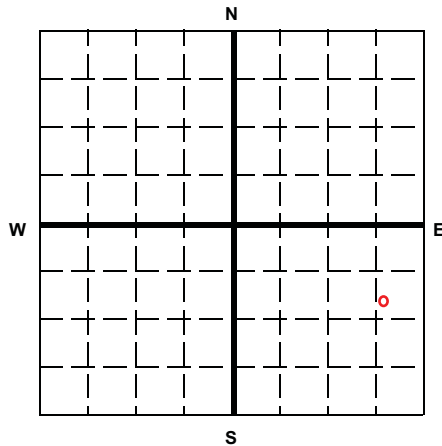
Name and Address of Facility

MPC 3D

Name and Address of Owner/Operator

Michigan Potash Operating, LLC c/o Fox Rothschild  
1225 17th Street, Suite 2200, Denver, CO 80215

Locate Well and Outline Unit on  
Section Plat - 640 Acres



State

Michigan

County

Osceola

Permit Number

Surface Location Description

SW 1/4 of SE 1/4 of NE 1/4 of SE 1/4 of Section 36 Township 17 Range 9

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface

Location  ft. frm (N/S) N Line of quarter section 1168' FRM N  
and  ft. from (E/W) E Line of quarter section. 442' FRM E

TYPE OF AUTHORIZATION

- ☒ Individual Permit  
☐ Area Permit  
☐ Rule

Number of Wells

WELL ACTIVITY

- ☒ CLASS I  
☐ CLASS II  
☒ Brine Disposal  
☐ Enhanced Recovery  
☐ Hydrocarbon Storage  
☐ CLASS III

Lease Name

Well Number

MPC 3D

### CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT (LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE
9 5/8	36	800	800	13 3/8
7	23-28	5160	5160	8 3/4

### METHOD OF EMPLACEMENT OF CEMENT PLUGS

- ☐ The Balance Method  
☐ The Dump Bailer Method  
☐ The Two-Plug Method  
☒ Other

### CEMENTING TO PLUG AND ABANDON DATA:

	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (inches)	8 3/4"	7"					
Depth to Bottom of Tubing or Drill Pipe (ft bottom of plug)	5500	5130					
Sacks of Cement To Be Used (each plug)	155	775					
Slurry Volume To Be Pumped (cu. ft.)	228	1140					
Calculated Top of Plug (ft.)	5130	0					
Measured Top of Plug (if tagged ft.)	5130	0					
Slurry Wt. (Lb./Gal.)	14.2	14.2					
Type Cement or Other Material (Class III)	A	A					

### LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED (if any)

From	To	From	To
5160 Open Hole	5550 Open Hole		
3900 Reed City Perfs (Est.Gross)	4080 Reed City Perfs (Est.Gross)		

Estimated Cost to Plug Wells

\$ 30,400

### Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

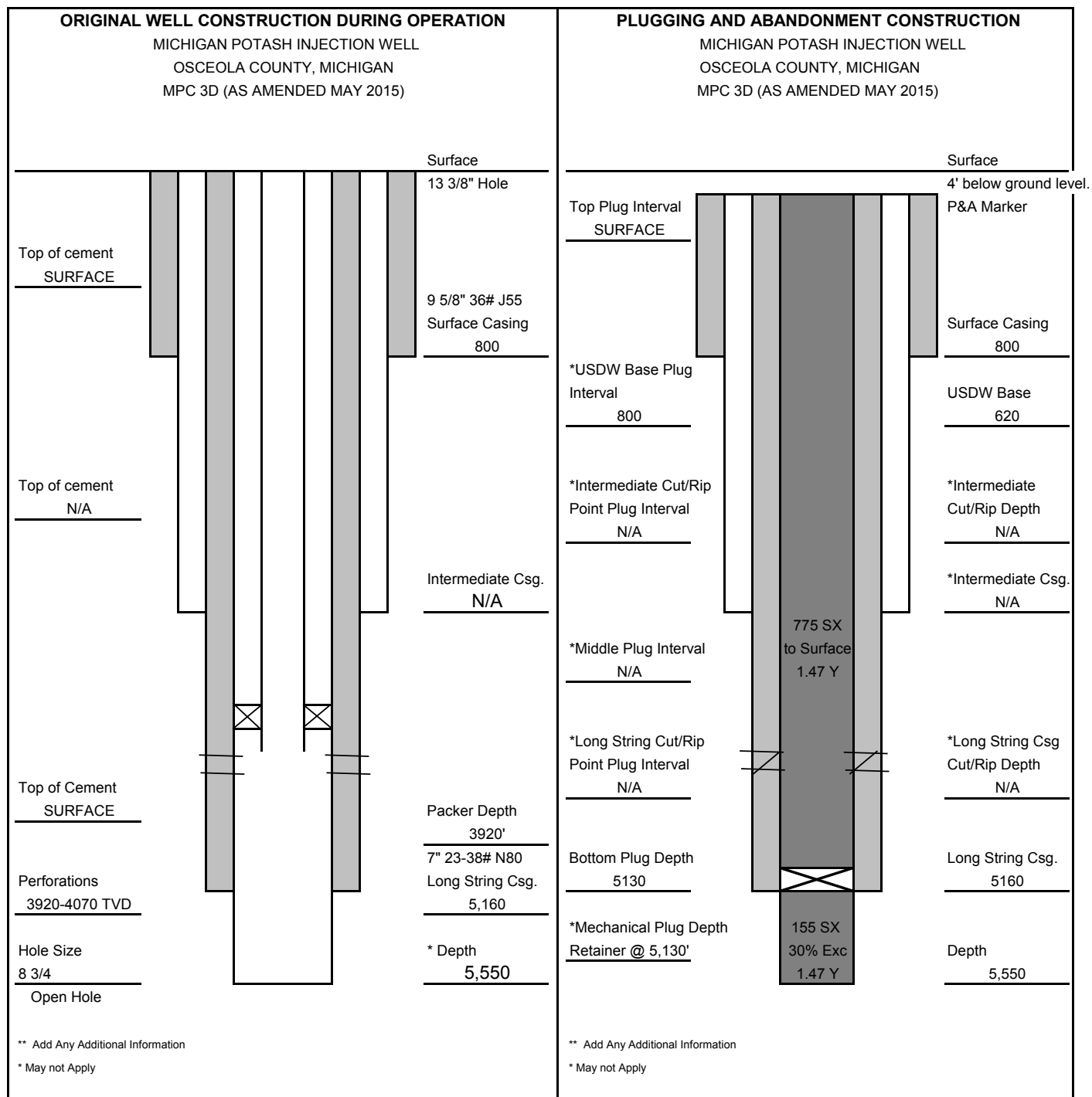
Name and Official Title (Please type or print)

Theodore A. Pagano, P.E., P.G., General Manager

Signature

Date Signed

05/22/2014



LIST OF ALL OPEN AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED			
Specify Open Hole/ Perforations/ Varied Casing	From	To	Formation Name
9 5/8" 36# Surface Casing	0	800	Surface
7" 23# Production Casing	0	5160	Production
Perforations	3920	4070	Reed City Dolomite (Estimated Gross)
OPEN HOLE	5160	5550	Bass Island Dolomite, Sylvania Sand

EPA request for Additional Information (May 2015):

3. The "Plugging and Abandonment Plan" (EPA Form 7520-14 page 1 and 2) did not contain the following information:

- a. "Casing and Tubing Record After Plugging" (page 1 of EPA form). This section of the form must identify all proposed casing strings.
  - b. "Depth to Bottom of Tubing or Drill Pipe" (page 1 of EPA form). The bottom of the proposed plugs must be identified in this space.
  - c. "Measured Top of Plug" (page 1 of EPA form). Although the title identifies measure top of plug, an estimation of the plug tops must be entered in the space.
  - d. "List All Open Hole and/or Perforated Intervals ... " (page 1 and 2 of EPA form). Open hole and perforated intervals must be identified. Please submit revised Plugging and Abandonment Plans (EPA Form 7520-14, pages 1 and 2) for all three wells with an authorized signature as set out in 40 C.F.R. §144.32(a)(1) or (2), as applicable.
- 

**1.0 Amend and/or replace "Plugging and Abandonment Plan" (EPA Form 7520-14).**

Please find EPA Form 7520-14 attached hereto, and referenced in Section 2.2 for the three proposed wellbores

4. Attachment H.2 of the permit application identifies that injection tests were made within the Reed City Dolomite. Results from these tests established a fracture gradient of 1.18 psi per foot and did not result in fracturing the tested formation. For EPA to consider this fracture gradient when calculating the maximum injection pressure for the proposed three wells, Michigan Potash must submit the test data referenced in Attachment H.2 of the application. A scaled map identifying Michigan Potash's three proposed injection wells and the well or wells used in the injection tests must also be submitted with the test results.
- 

#### **4.1 Submit injection test data for the Reed City Dolomite.**

The reference data for Attachment H.2 is identified with the following *active* Non-Hazardous Class I injection wells, and can be referenced via Region V permit files as follows:

1995 RE-APPLICATION for underground permit No. MI-133-1I-0001 (The Woodward 1-26):  
APPENDIX A.

1995 RE-APPLICATION for underground permit No. MI-133-1I-0002 (The Thomas 1-26):  
APPENDIX A.

The above described data has been utilized subsequently in the 2006 RE-APPLICATION for both MI-133-1I-0001 (the Woodward 1-26) and MI-133-1I-0002 (the Thomas 1-26), as attached hereby for ease of reference, and on the permit criteria.

#### **4.2 Submit a scaled map identifying Michigan Potash's three proposed injection wells and the well or wells used in the injection tests.**

Please see the attached, AMENDED ATTACHEMENT H.2. FIGURE H.2 Map showing Existing Class I NON-HAZARDOUS Injection Wells containing injection falloff and in-situ stress data , the Thomas 1-26 (NW4NW4 Section 26) and the Woodward 1-26 (NE4SW4 Section 26).

Please also see re-attached, ATTACHMENT B, Figure B2, concerning the above referenced wells with in-situ stress data.

#### **4.3 Other applicable information.**

As per section 2.1 of this written response, and as per section L.1 (As Amended May 22, 2015, See Section 2.1), Michigan Potash proposes to conduct all the necessary and applicable in-situ stress tests in the event the Reed City Dolomite is accessed via perforations.



ORIGINAL

**PERMIT RE-APPLICATION  
CLASS I NON-HAZARDOUS INJECTION WELL**

**WOODWARD 1-26  
(MI-133-1I-0001)**

**MOSAIC POTASH HERSEY, LLC  
HERSEY, MICHIGAN**

*formerly  
Kalium Chemicals, Ltd.  
IMC Kalium, Ltd.  
PPG Industries, Inc.*

**SUBSURFACE PROJECT NO. 60Z5849**

**REPORT SUBMITTED  
AUGUST 2006**

**PREPARED BY  
SUBSURFACE TECHNOLOGY, INC.  
SOUTH BEND, INDIANA**



## H. OPERATING DATA

### H.1 Average and Maximum Injection Rate and Volume

Disposal flow rates vary from a minimum of 90 gallons per minute (129,000 gallons per day) to a maximum of 600 gallons per minute (864,000 gallons per day). The average disposal flow rate for the Woodward Well is 175 gallons per minute (252,000 gallons per day). At any given time, disposal may occur to a single well or to both wells simultaneously.

### H.2 Average and Maximum Injection Pressures

The maximum injection pressure has been set by permit at 2,576 psig for the Woodward 1-26 well.

Injection fluid may be water (specific gravity of 1.0) or a partially saturated sodium chloride/potassium chloride brine solution with a specific gravity as high as 1.2.

Previous documents submitted to the USEPA (*1995 Re-Permit Application (Attachment H-2 and Appendix A)*; *1984 Permit Application*) indicated a maximum injection pressure for water of 2,928 psi and for brine of 2,589 psi. This information was based upon previously conducted fracture testing at the top perforation of the injection zone (4,647 psi). A pressure gradient of 1.18 psi per foot was calculated.

Upon review of the previous ten years of operation records, the average injection pressure remains between 600 to 900 psi as stated in the previous *1995 Permit Re-Application*.

### H.3 Source(s) of Waste (brief description of industrial process(es) which produce the waste)

The wastestream injected into the Woodward 1-26 well is non-hazardous waste brine generated by solution mining of potash (KCL) and salt (NaCl) deposits.

Sodium hydroxide is used in the stripping of  $H_2S$  from the production brine. Pump packing seal water (<10gpm), and a bleed system (<10gpm) containing some sodium bisulfite from the  $H_2S$  stripping system are also added to the disposal wastestream.

A series of four purge wells on the site intercept and pump groundwater containing chlorides (average concentration 7,456 mg/l) into the process stream that may partially reach the wastestream entering the disposal wells.

## ATTACHMENT A

SUMMARY OF OPERATING, MONITORING AND REPORTING REQUIREMENTS

CHARACTERISTIC	LIMITATION	MINIMUM MONITORING FREQUENCY	MINIMUM REPORTING FREQUENCY
Injection Pressure	2526 psig maximum*	continuous	monthly
Annulus Pressure	100 psig minimum	continuous	monthly
Annulus/Tubing Differential	100 psig minimum above operating injection pressure	continuous	monthly
Flow Rate		continuous	monthly
Cumulative Volume		continuous	monthly
Annulus Fluid Loss		monthly	monthly
Chemical Composition of Injected Fluids**		quarterly	quarterly
Physical Characteristics of Injected Fluids**		quarterly	quarterly

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Sampling Location: The sample location will be at a manual spigot, located at the discharge point of the final filtration unit and the suction of the injection pumps.

\* The limitation on injection pressure will serve to prevent injection-formation fracturing. This limitation was calculated using the following formula:  $[\{\text{Fracture Gradient} - (0.433 \text{ psi/ft} \times \text{specific gravity})\} \times \text{depth}] - 14.7 \text{ psi}$ . The fracture gradient of 1.17 psi/ft was determined by site specific testing of the injection zone. The Dundee Limestone at 3906 was used as the depth and a specific gravity of 1.2 was used for the injection fluid. If the permittee decides in the future to perforate the casing and inject directly into the Dundee Limestone, the permittee will be required to conduct approved in-situ stress tests, in which case the maximum injection pressure will be modified to reflect the specific value of the fracture gradient in this well. Such modification shall be considered a minor modification as allowed for at 40 CFR §144.41(f). The permittee is also required to submit the test procedures to the Director for approval prior to conducting the tests.

\*\* As specified in the Sampling and Analysis Plan, found in the administrative record for this permit. At a minimum, this analysis shall include, but not be limited to, the following: Temperature, Specific Conductance, pH and Specific Gravity.



ORIGINAL

PERMIT RE-APPLICATION  
CLASS I NON-HAZARDOUS INJECTION WELL

THOMAS 1-26  
(MI-133-1I-0002)

MOSAIC POTASH HERSEY, LLC  
HERSEY, MICHIGAN

*formerly*  
*Kalium Chemicals, Ltd.*  
*IMC Kalium, Ltd.*  
*PPG Industries, Inc.*

SUBSURFACE PROJECT NO. 60Z5849

REPORT SUBMITTED  
AUGUST 2006

PREPARED BY  
SUBSURFACE TECHNOLOGY, INC.  
SOUTH BEND, INDIANA

## H. OPERATING DATA

### H.1 Average and Maximum Injection Rate and Volume

Disposal flow rates vary from a minimum of 90 gallons per minute (129,000 gallons per day) to a maximum of 600 gallons per minute (864,000 gallons per day). The average disposal flow rate for the Thomas Well is 350 gallons per minute (504,000 gallons per day). At any given time, disposal may occur to a single well or to both wells simultaneously.

### H.2 Average and Maximum Injection Pressures

The maximum injection pressure has been set by permit at 2,533 psig for the Thomas 1-26 well.

Injection fluid may be water (specific gravity of 1.0) or a partially saturated sodium chloride/potassium chloride brine solution with a specific gravity as high as 1.2.

Previous documents submitted to the USEPA (*1995 Re-Permit Application (Attachment H-2 and Appendix A)*; *1984 Fenix & Scisson Permit Application*) indicated a maximum injection pressure for water of 2,928 psi and for brine of 2,589 psi. This information was based upon previously conducted fracture testing at the top perforation of the Reed City Dolomite injection interval (4,647 psi). A pressure gradient of 1.18 psi per foot was calculated.

Upon review of the previous ten years of operation records, the average injection pressure remains between 600 to 900 psi as stated in the previous *1995 Permit Re-Application*.

### H.3 Source(s) of Waste (brief description of industrial process(es) which produce the waste)

The wastestream injected into the Thomas 1-26 well is non-hazardous waste brine generated by solution mining of potash (KCl) and salt (NaCl) deposits.

Sodium hydroxide is used in the stripping of  $H_2S$  from the production brine. Pump packing seal water (<10gpm) and a bleed system (<10gpm) containing some sodium bisulfite from the  $H_2S$  stripping system are also added to the disposal wastestream. Boiler blowdown of typically less than 10 gpm, floor washdown of less than 10 gpm, and YPS (>1% by wt.) used as an anti-caking coating for salt all become part of the disposal waste stream.

A series of four purge wells on the site intercept and pump groundwater containing chlorides (average concentration 7,456 mg/l) into the process stream that may partially reach the wastestream entering the disposal wells.



## ATTACHMENT A

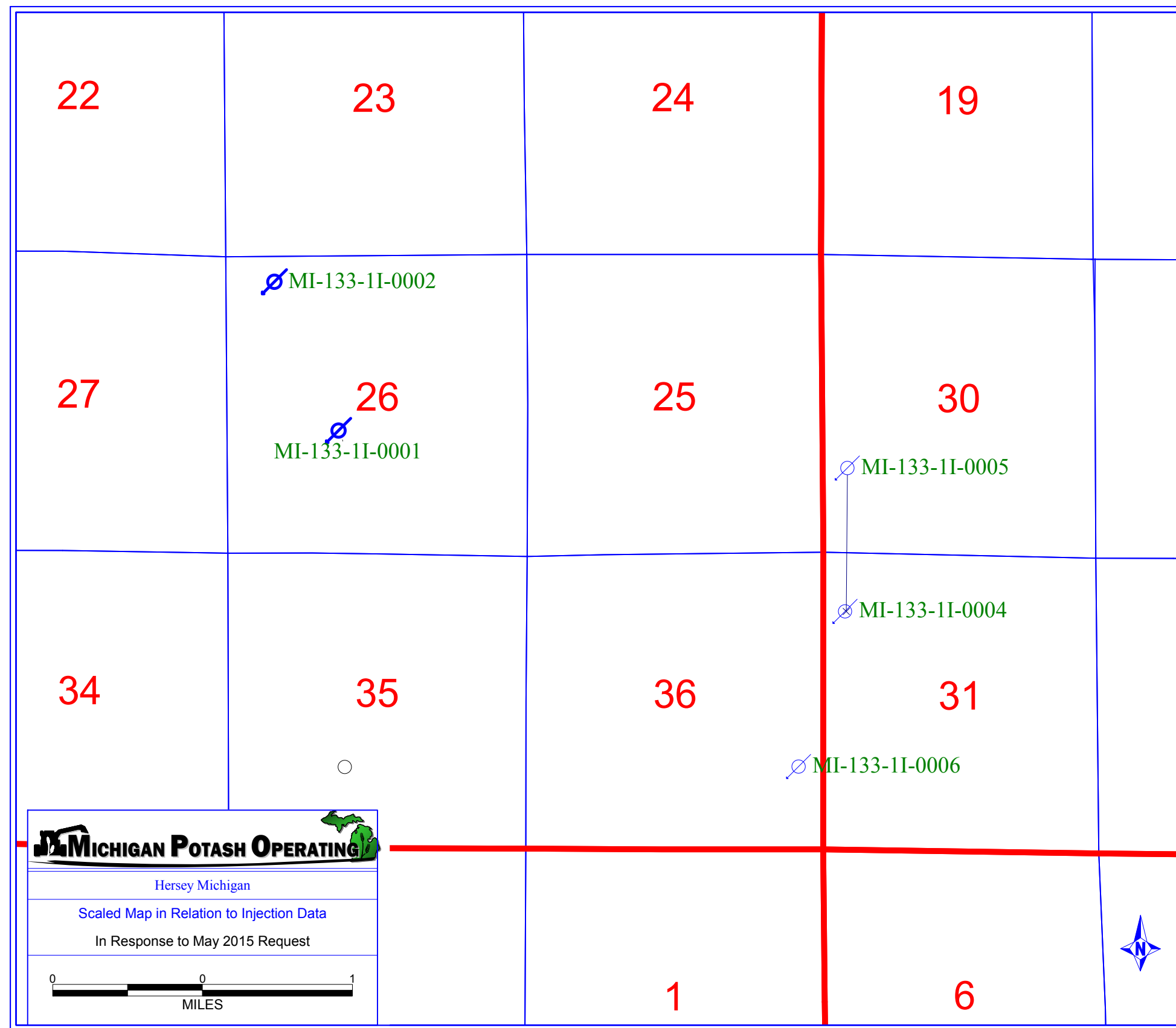
**SUMMARY OF OPERATING, MONITORING AND REPORTING REQUIREMENTS**

CHARACTERISTIC	LIMITATION	MINIMUM MONITORING FREQUENCY	MINIMUM REPORTING FREQUENCY
Injection Pressure	2483 psig maximum*	continuous	monthly
Annulus Pressure	100 psig minimum	continuous	monthly
Annulus/Tubing Differential	100 psig minimum above operating injection pressure	continuous	monthly
Flow Rate		continuous	monthly
Cumulative Volume		continuous	monthly
Annulus Fluid Loss		monthly	monthly
Chemical Composition of Injected Fluids**		quarterly	quarterly
Physical Characteristics of Injected Fluids**		quarterly	quarterly

Sampling Location: The sample location will be at a manual spigot, located at the discharge point of the final filtration unit and the suction of the injection pumps.

\* The limitation on injection pressure will serve to prevent injection-formation fracturing. This limitation was calculated using the following formula:  $[\{\text{Fracture Gradient} - (0.433 \text{ psi/ft} \times \text{specific gravity})\} \times \text{depth}] - 14.7 \text{ psi}$ . The fracture gradient of 1.17 psi/ft was determined by site specific testing of the injection zone. The Dundee Limestone at 3840 was used as the depth and a specific gravity of 1.2 was used for the injection fluid. If the permittee decides in the future to perforate the casing and inject directly into the Dundee Limestone, the permittee will be required to conduct approved in-situ stress tests, in which case the maximum injection pressure will be modified to reflect the specific value of the fracture gradient in this well. Such modification shall be considered a minor modification as allowed for at 40 CFR §144.41(f). The permittee is also required to submit the test procedures to the Director for approval prior to conducting the tests.

\*\* As specified in the Sampling and Analysis Plan, found in the administrative record for this permit. At a minimum, this analysis shall include, but not be limited to, the following: Temperature, Specific Conductance, pH and Specific Gravity.



AMENDED ATTACHEMENT H.2. FIGURE H.2 Map showing Existing Class I NON-HAZARDOUS Injection Wells containing injection falloff and in-situ stress data , the Thomas 1-26 (NW4NW4 Section 26) and the Woodward 1-26 (NE4SW4 Section 26).



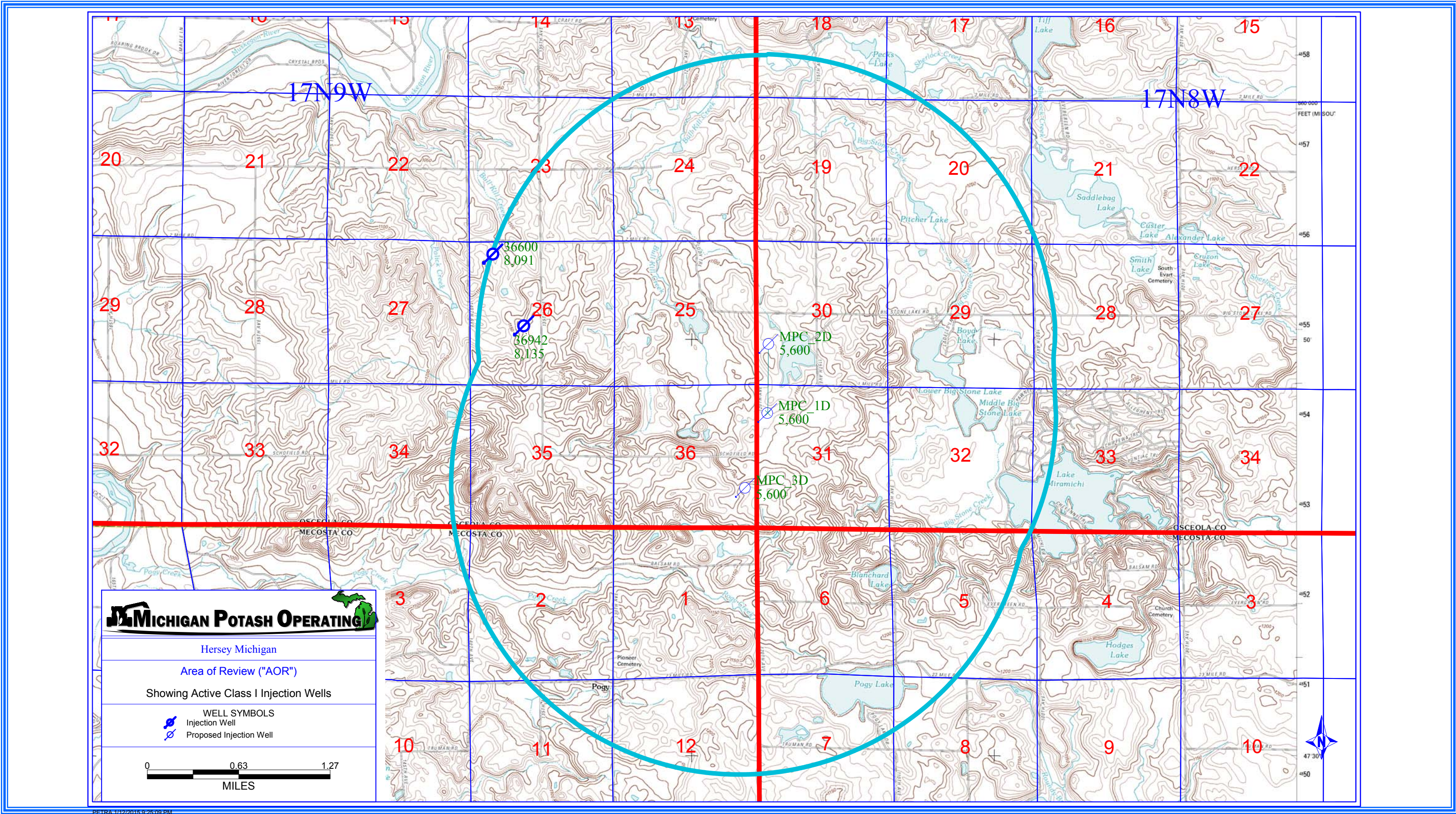


Figure B2. Map showing Existing Class I NON-HAZARDOUS Injection Wells, the Thomas 1-26 (NW4NW4 Section 26) and the Woodward 1-26 (NE4SW4 Section 26).



EPA request for Additional Information (May 2015):

- 5.0 Attachment H.2 of the permit application identifies a calculated friction loss within the well of 38 psi. For EPA to consider this friction loss when calculating the maximum injection pressure within the three proposed injection wells, Michigan Potash must submit the well friction analysis that established the 38 psi pressure loss.
- 

**5.1 Submit the well friction analysis that established the 38 psi pressure loss.**

The 38 psi pressure loss calculation referenced by Michigan Potash, is based on step down tests as performed by IMC Kalium in 1995 and reported by they and the their successors in interest (See Section 4.0: 1995 RE-APPLCIATION for underground permit No. MI-133-II-0002 (The Thomas 1-26), APPENDIX A).

A 38 psi pressure loss consideration is not requested by Michigan Potash at this time.



EPA request for Additional Information (May 2015):

6.0 Attachment O of the permit application, "Plans For Well Failures", must include a statement that EPA will be contacted immediately upon the determination that mechanical integrity has been lost in any of the three proposed injection wells.

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**6.1 Amend Attachment O.**

Please see the attached and amended Attachment O, including a statement that the EPA Region V, UIC branch will be immediately contacted upon the determination that there may a loss of mechanical integrity.



**US EPA UIC PERMIT APPLICATION FORM 7520-6**

***NON HAZARDOUS***

**CLASS I**

**ATTACHMENT O: PLANS FOR WELL FAILURES  
ATTACHEMENT AMENDED MAY 22<sup>ND</sup>, 2015**

**IN RESPONSE TO REQUEST FOR ADDITIONAL  
INFORMATION MAY 11TH, 2015**

**THE UNITED STATES POTASH PROJECT  
JANUARY 2015**

ATTACHEMENT O.  
CONTINGENCY PLAN FOR WELL FAILURES.

EPA instruction, form 7520-6 (2011):

Outline contingency plans (proposed plans, if any, for Class II) to cope with all shut-ins or wells failures, so as to prevent migration of fluids into any USDW. The applicant should submit contingency plans for 1) actions that will be taken if mechanical integrity of well is lost; and 2) storage or alternate treatment or disposal of waste in the case of emergency shut-in.

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## O.1 Contingency Plan

### **Item 1: Actions to be taken in the event of loss of mechanical integrity:**

Brine is transmitted through the wells in tubing suspended from the wellhead and extending to a point near the top of the receiving formation. At or near the bottom of the tubing, the annulus between the tubing and the cemented casing is sealed with a packer; thus, the entire annulus from the wellhead to the packer is sealed off from the injected brine. The annulus is filled with an inhibited brine to a point slightly below the freeze line where the remainder of space is filled with oil. The annulus pressure is maintained to hold 20 psi at all times at surface and is monitored with a continuously recording pressure gauge.

If mechanical integrity was compromised the annulus fluid pressure would change and any change would be immediately detected by a change in the annulus pressure. If the injection tubing or packer developed a leak, a change in the annulus pressure would develop and would also be immediately detected by the continuously recording pressure gauge. In either case, investigative and remedial action would be promptly taken to replace or repair the part damaged following the procedures listed in Section C-1.

***Following any indication that there may be a loss of mechanical integrity, injection will immediately cease and the EPA Region V, UIC Branch will be immediately notified, but within in a time not to exceed 24 hours of the indication of suspected loss of mechanical integrity. The Michigan Department of Environmental Quality will be also be notified within the same period of suspected loss of mechanical integrity.***

The report will be ready to relay the following information:

- Name, location, organization and telephone number of the person submitting the report;
- Exact address or location and phone number of the responsible facility;
- Location of the well;
- The date and time of the first indication of loss of mechanical integrity;
- Any damages caused by the loss;
- Danger or threat posed by the loss;
- Actions being used to stop, remove, and mitigate the effects of the loss of mechanical integrity;
- The names of individuals and/or organizations that have also been contacted; and
- Any other information that may facilitate the correct action needed to remediate the loss of mechanical integrity; and
- Additional preventive measures taken or contemplated to minimize the possibility of recurrence; and

- Such other information as the EPA Regional Administrator may reasonably require pertinent to the identification of loss of mechanical integrity and future preventative needs.

**Item 2: Plan for alternate disposal in the case of emergency shut-in:**

The multiple well application allows for an excess of disposal capacity and optionally to allow for system upsets, emergency shut-in, and contingent disposal capacity.

If failure were to occur to one well, that well would be shut-in immediately, and the entire disposal flow would be directed to the other well(s). If necessary, flow rates would be reduced as needed to remain below permitted injection pressure limits.

EPA request for Additional Information (May 2015):

7.0 Attachment C of the application, "Corrective Action Plan and Well Data" identifies wells within the 2 mile area of review that penetrate the proposed injection formations. Construction and plugging documentation was not provided for the following wells:

- a. Jensen 1-2, Permit # 37188
- b. Pilarski 1-12, Permit #00340
- c. Johnson 1-6, Permit #36067
- d. Johnson 2-1, Permit #00377
- e. Johnson 3-1, Permit #00337

Please submit the well construction and plugging documentation for these wells.

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**7.1 Submit the well construction and plugging documentation.**

Find attached, a well review index, along with well files for the referenced wells, in the order listed above.

## PLUGGING AND WELL HISTORY REVIEW INDEX

APPENDIX TAB LETTER	Review Check	TRS	API Number	Permit Number	Well Name and Number	Total Depth	Formation at Total Depth	Drill Date	Well Status	Well Type	WH_Lat	WH_Long	Operator Name
Z		17N-9W-36	21-133-3611-00-000	36110	THOMPSON 3-36	8366	CINCINNATIAN	Oct-82	INACTIVE	NATURAL GAS WELL	43.8203	-85.3311	Marathon Oil Co.
A		17N-9W-36	21-133-36068-00-00	36068	BABCOCK ET AL 1-36	8200	CABOT HEAD	Sep-83	INACTIVE	NATURAL GAS WELL	43.8265	-85.3272	Marathon Oil Co.
B		17N-9W-36	21-133-36925-00-00	36925	BALDINO 1-36	8200	CABOT HEAD	Sep-83	INACTIVE	NATURAL GAS WELL	43.8203	-85.341	Marathon Oil Company
H		17N-9W-36	21-133-36991-00-00	36991	HODGES ET AL 1-36	8198	CLINTON	Oct-83	INACTIVE	DRY HOLE	43.8152	-85.3294	Marathon Oil Co.
doesn't penetrate		17N-9W-36	21-133-26888-00-00	26888	GREIN, DONALD 1	1649	BROWN LIMESTONE	Aug-67	INACTIVE	DRY HOLE	43.8225	-85.3356	Consumers Energy Company
doesn't penetrate		17N-9W-36	21-133-31089-00-00	31089	THOMPSON, DON; HODGES, FRANK; SMIT	1616	MICHIGAN STRAY	Jul-76	INACTIVE	NATURAL GAS WELL	43.8186	-85.3301	Mutch Harry L
doesn't penetrate		17N-9W-36	21-133-30537-00-00	30537	THOMPSON, DON; HODGES, FRANK; SMIT	1602	MARSHALL	Nov-75	INACTIVE	NATURAL GAS WELL	43.8183	-85.3299	Mutch Harry L
doesn't penetrate		17N-9W-36	21-133-2871-00-000	28710	THOMPSON & RANDOLPH 1	1586	MICHIGAN STRAY	Dec-71	INACTIVE	NATURAL GAS WELL	43.8182	-85.3394	Mutch Harry L
doesn't penetrate		17N-9W-36	21-133-28710-01-00	28710	THOMPSON & RANDOLPH 1	1586	MICHIGAN STRAY	Dec-71	INACTIVE	NATURAL GAS WELL	43.8182	-85.3394	Mutch Harry L
doesn't penetrate		17N-9W-36	21-133-28498-01-00	28498	GREIN, DONALD 1	1539	MICHIGAN STRAY	Aug-71	INACTIVE	NATURAL GAS WELL	43.8252	-85.3392	Hersey Oil and Gas Co.
doesn't penetrate		17N-9W-36	21-133-28498-00-00	28498	GREIN, DONALD 1	1526	MICHIGAN STRAY	Aug-71	INACTIVE	NATURAL GAS WELL	43.8252	-85.3392	Hersey Oil and Gas Co.
doesn't penetrate		17N-9W-36	21-133-28365-00-00	28365	THOMPSON, EDITH 1	1518	MICHIGAN STRAY	Jun-71	INACTIVE	NATURAL GAS WELL	43.8253	-85.3295	Mutch Harry L
doesn't penetrate		17N-9W-35	21-133-36627-00-00	36627	STATE HERSEY 1-35			Apr-83	INACTIVE	LOCATION	43.8167	-85.3509	Rovsek Aldolph E and Muskegon Development Company
X		17N-9W-35	21-133-36355-00-00	36355	STATE HERSEY 2-35	8310	CINCINNATIAN	Jan-83	INACTIVE	DRY HOLE	43.8203	-85.3604	Marathon Oil Co.
F		17N-9W-35	21-133-38748-00-00	38748	GREIN 1-35	8206	CABOT HEAD	Jun-85	INACTIVE	NATURAL GAS WELL	43.8238	-85.346	Marathon Oil
doesn't penetrate		17N-9W-35	21-133-28888-00-00	28888	RANDOLPH & PAINE & THIEL UNIT 1	1655	MICHIGAN STRAY	Jul-72	INACTIVE	DRY HOLE	43.825	-85.3592	Mutch J O
doesn't penetrate		17N-9W-35	21-133-28786-00-00	28786	GREIN, DONALD & PAINE, HENRY 1	1638	MICHIGAN STRAY	Mar-72	INACTIVE	NATURAL GAS WELL	43.8251	-85.349	Hersey Oil and Gas Co.
R		17N-9W-26	21-133-37519-00-00	37519	MILLER 1-25	8425	CABOT HEAD	Aug-84	INACTIVE	NATURAL GAS WELL	43.8334	-85.3463	Marathon Oil Co.
DD		17N-9W-26	21-133-36942-00-00	36942	WOODWARD ET AL 1-26	8135	CABOT HEAD	Oct-83	INACTIVE	DRY HOLE	43.8346	-85.3568	PPG Oil and Gas Company, Inc.
K		17N-9W-26*	21-133-00378-70-00	378	KALIUM 1042*	8116	A-1 SALT	Feb-85	INACTIVE	PART 625, CLASS III	43.8401	-85.3619	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
Y		17N-9W-26*	21-133-366-00-0000	36600	THOMAS 1-26*	8085	CABOT HEAD	Jan-84	INACTIVE	DRY HOLE	43.8418	-85.3611	PPG Oil and Gas Company, Inc.
L		17N-9W-26*	21-133-00379-70-00	379	KALIUM 1052*	8045	A-1 SALT	Mar-85	INACTIVE	PART 625, CLASS III	43.8398	-85.3619	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
I		17N-9W-26*	21-133-00394-70-00	394	KALIUM HERSEY 1031*	7973	A-1 SALT	Oct-94	INACTIVE	PART 625, CLASS III	43.8394	-85.3618	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
records unavailable		17N-9W-26*	21-133-00448-70-00	448	KALIUM HERSEY 2041*	7941	A-1 SALT	Jun-00	INACTIVE	PART 625, CLASS III	43.8332	-85.3591	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
records unavailable		17N-9W-26*	21-133-00348-70-00	348	KALIUM 1011*	7827	A-1 EVAPORITE	Nov-84	INACTIVE	PART 625, CLASS III	43.8405	-85.3615	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
records unavailable		17N-9W-26*	21-133-00437-70-00	437	KALIUM HERSEY 2081*	7811	A-1 SALT	7-Jun	INACTIVE	PART 625, CLASS III	43.8327	-85.3592	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
J		17N-9W-26*	21-133-00381-70-00	381	KALIUM 1031*	4800	A-1 SALT	Feb-92	INACTIVE	PART 625, CLASS III	43.8396	-85.3619	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
doesn't penetrate		17N-9W-26	21-133-28635-00-00	28635	PAINE, HENRY 1	1558	MICHIGAN STRAY	Nov-71	INACTIVE	NATURAL GAS WELL	43.8324	-85.3494	Mutch Harry L
doesn't penetrate		17N-9W-25	21-133-30341-00-00	30341	MILLER, DOUGLAS & THIEL, HAULDAH	1561	BROWN LIMESTONE	Aug-75	INACTIVE	DRY HOLE	43.8319	-85.3392	Mutch Harry L
doesn't penetrate		17N-9W-25	21-133-30384-00-00	30384	JOHNSON, WALT & MILLER, DOUG & THIE	1529	MICHIGAN STRAY	Aug-75	INACTIVE	DRY HOLE	43.8326	-85.3286	Mutch J O
doesn't penetrate		17N-9W-25	21-133-12066-00-00	12066	JOHNSON-CODY ET AL COMM. 1	1520	MARSHALL	Jan-46	INACTIVE	DRY HOLE	43.8392	-85.3297	Oryx Energy Co. and Carter Oil Co.
doesn't penetrate		17N-8W-32	21-133-27307-00-00	27307	MANEY, NORMAN 1	1660	MARSHALL	Jul-68	INACTIVE	DRY HOLE	43.8223	-85.3049	Consumer Power and Michigan Consolidated Gas
E		17N-8W-31	21-133-34558-00-00	34558	FREUDENBURG 1-31	10858	PRAIRIE DU CHIEN	Jul-81	INACTIVE	DRY HOLE	43.8265	-85.3083	JEM Petroleum Corp.
F		17N-8W-31	21-133-358-00-0000	35800	GRAY 1-31	9769	PRAIRIE DU CHIEN	Aug-82	INACTIVE	NATURAL GAS WELL	43.8275	-85.3224	Marathon Oil Co.
U		17N-8W-31	21-133-36336-00-00	36336	PARK 1-31	8216	CLINTON	Feb-84	INACTIVE	DRY HOLE	43.8203	-85.322	Marathon Oil Co.
E		17N-8W-31	21-133-34558-01-00	34852	FREUDENBURG 1-31A	8183	DUNDEE	Aug-81	INACTIVE	DRY HOLE	43.8265	-85.3083	JEM Petroleum Corp.
doesn't penetrate		17N-8W-31	21-133-31786-00-00	31786	KNAPP, GERALD & PARKS, ROBERT 1-3	1590	MICHIGAN STRAY	Sep-77	INACTIVE	NATURAL GAS WELL	43.818	-85.32	Hersey Oil and Gas Co.
CC		17N-8W-30	21-133-35977-00-00	35977	WARK 1-30	8371	CINCINNATIAN	Sep-82	INACTIVE	DRY HOLE	43.8421	-85.3128	Willmet Inc.
P		17N-8W-30	21-133-33466-00-00	33466	MANEY, NORMAN 1-30	5080	AMHERSTBURG	Feb-80	INACTIVE	DRY HOLE	43.8347	-85.3196	Dart Oil and Gas Co.

APPENDIX TAB LETTER	Review Check	TRS	API Number	Permit Number	Well Name and Number	Total Depth	Formation at Total Depth	Drill Date	Well Status	Well Type	WH_Lat	WH_Long	Operator Name
O		17N-8W-30	21-133-27159-00-00	27159	MADDERN, H 1	4030	DUNDEE	Feb-68	INACTIVE	DRY HOLE	43.8333	-85.3126	Madlou Inc.
AA		17N-8W-19	21-133-38463-00-00	38463	VUKIN UNIT 1-19	8385	CINCINNATIAN	Feb-85	INACTIVE	DRY HOLE	43.844	-85.3148	PPG Oil and Gas Company, Inc. and Amoco Production Co.
AA		17N-8W-19	21-133-38463-70-00	5006	VUKIN UNIT 1-19	8385		Dec-84	INACTIVE	DRY HOLE	43.844	-85.3148	PPG Oil and Gas Company, Inc. and Amoco Production Co.
Submitted May 22nd 2015		16N-9W-2*	21-107-37188-00-00	37188	JENSEN 1-2*	8085	CABOT HEAD	Nov-83	INACTIVE	DRY HOLE	43.8073	-85.3455	Marathon Oil Co.
16N-9W-12		16N-9W-12	21-107-00340-70-00	340	PILARSKI 1-12	8318	CINCINNATIAN	Aug-84	INACTIVE	DRY HOLE	43.7974	-85.3266	PPG Industries, Inc.
T		16N-9W-12*	21-107-36283-00-00	36283	PARK 1-12*	8215	CINCINNATIAN	Jan-83	INACTIVE	DRY HOLE	43.798	-85.3409	Willmet Inc.
BB		16N-9W-11	21-107-00339-70-00	339	WARD 1-11*	8121	CINCINNATIAN	Aug-84	INACTIVE	DRY HOLE	43.7901	-85.3466	PPG Industries, Inc.
Submitted May 22nd 2015		16N-9W-1	21-107-00377-70-00	377	JOHNSON 2-1	8085	A-1 SALT	Apr-84	INACTIVE	DRY HOLE	43.8098	-85.3291	PPG Industries, Inc.
Submitted May 22nd 2015		16N-9W-1	21-107-00337-70-00	337	JOHNSON 3-1	8073	A-1 EVAPORITE	May-84	INACTIVE	DRY HOLE	43.8098	-85.329	PPG Industries, Inc.
W		16N-8W-7	21-107-36187-00-00	36187	STEIN 1-7	8380	CINCINNATIAN	Nov-82	INACTIVE	DRY HOLE	43.7911	-85.312	Willmet Inc.
Submitted May 22nd 2015		16N-8W-6	21-107-36067-00-00	36067	JOHNSON ET AL 1-6	8386	CINCINNATIAN	Oct-82	INACTIVE	DRY HOLE	43.8057	-85.322	Marathon Oil Co.
doesn't penetrate		16N-8W-6	21-107-30728-00-00	30728	MCLACHLAN, GEORGE 1-6	1670	MICHIGAN STRAY	May-76	INACTIVE	DRY HOLE	43.8033	-85.3101	Mutch Harry L
doesn't penetrate		16N-8W-6	21-107-30654-00-00	30654	KNAPP, GERALD & JOHNSON, DON 1-6	1610	MICHIGAN STRAY	Dec-75	INACTIVE	NATURAL GAS WELL	43.8109	-85.3198	Mutch Harry L
V		16N-8W-18*	21-107-3689-00-000	36890	STEIN 1-18*	8264	CINCINNATIAN	Aug-83	INACTIVE	DRY HOLE	43.7765	-85.3074	PPG Oil and Gas Company, Inc.

**a. Jensen 1-2, Permit # 37188**



STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

WELL PLUGGING RECORD

(Submit in TRIPLICATE Within 30 Days After Plugging is Completed)

AMENDED 1-27-88

PERMIT NUMBER

37188

FIELD NAME

Hersey

COMPLETE NAME(S) AND ADDRESS OF WELL OWNER

PPG Oil & Gas Co.,

COMPLETE LEASE OR FARM NAME(S)

Jensen

WELL NUMBER

1-2

WELL LOCATION

SE ¼ SE ¼ NE ¼ SEC. 2 T. 16N R. 9W

TOWNSHIP

Grant

COUNTY

Mecosta

TYPE OF WELL (Oil, Gas, Dry Hole, etc.)

Dry Hole

TOTAL DEPTH

8085

FORMATION

Cabot Head

DATE PLUGGING STARTED

11-30-83

DATE PLUGGING COMPLETED

11-30-83

DEPT. REPRESENTATIVE(S) WHO ISSUED PERMIT OR WITNESSED PLUGGING

Ben Gunning

CASING RECORD

SIZE CASING	DEPTH SET	AMOUNT RECOVERED	SHOT OR RIPPED
24"	132	None	
13 3/8"	848	None	
9 5/8"	5408	None	

BRIDGES OR PLUGS

TYPE (Brush, Stone, Cement, Mechanical, etc.)	DEPTH PLACED	SACKS OF CEMENT AND ADDITIVES
Cement	8085-5885	450 Sx
Cement	5885-5300	290 Sx

Were tools, tubing, casing, etc., lost or left in the hole before or during plugging?

☐ YES ☒ NO

If yes, give details:

Did a Service Company pump mud, spot cement, or set bridge plugs?

☒ YES ☐ NO

If yes, give name and address:

Halliburton

Was the well plugged by a Company or Contractor other than Owner or Operator?

☐ YES ☒ NO

If yes, give name and address:

Marvin Woods

Representatives of Owner, Operator, Company, or Contractor who witnessed plugging:

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

Ran drill pipe in and set 3 150 sx plugs from TD to 5885, set 290 sx from 5885 to 5300 and bolted temperature plat on wellhead. Temporarily abandoned. On 8-23-84 tagged cement at 5195' / On 8-24-84, Halliburton spotted 180 sack plugs of Howcolite cement at each depth of 5195', 4358', 3521', 2684', and 1847'. a 165 sack Howcolite plug at 1010' and a 75 sack plug of Class A cement at 210'.  
13 3/8" and 9 5/8" casings capped with 1/2" plate 3' below grade.

(USE REVERSE SIDE IF NEEDED)

CERTIFICATION

"I state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction, and that the facts stated herein are true, correct and complete to the best of my knowledge."

NAME AND TITLE (Typed or Printed)

Donald D. Metzger, Resident Manager

COMPANY NAME AND ADDRESS

Kalium Chemicals  
11126 140th Ave.  
Hersey, MI 49639

SIGNATURE

*Donald D. Metzger*

DATE (Month, Day, Year)

1-28-88

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

MINERAL WELL PLUGGING RECORD

File in DUPLICATE Within 30 Days After Plugging is Completed

AMENDED 1-27-88

PERMIT NUMBER

1245-831-354

DATE

1-22-88

OWNER OR OPERATOR

PPG Oil & Gas Co., Inc.

ADDRESS

One PPG Place, Pittsburgh, PA 15272

WELL NAME

Jensen

WELL NUMBER

1-2

WELL LOCATION

SE 1/4 SE 1/4 NE 1/4 SEC. 2 T. 16N R. 9W

TOWNSHIP

Grant

COUNTY

Mecosta

TYPE OF WELL (Brine, Disposal, Storage, or Test)

Test

TOTAL DEPTH

8085

FORMATION

Cabot Head

DATE PLUGGING STARTED

8-24-84

DATE PLUGGING COMPLETED

8-24-84

WAS PERMISSION OF DEPT. OF NATURAL RESOURCES  
OBTAINED BEFORE PLUGGING BEGAN?

☐ YES

☐ NO

NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING

CASING SIZE	WHERE SET	AMOUNT RECOVERED	SHOT OR RIPPED	TYPE OF BRIDGES OR PLUGS	DEPTH PLACED	NUMBER SACKS
24"	132	None		Cement	8085-5885	450
13 3/8"	848	None		Cement	5885-5300	290
9 5/8"	5408	None		Cement (howcolite) 5195', 4358', 3521', 2684', 1847'		180 at each depth
				Cement (Howcolite)		165
				Cement (Class A)	210'	75

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

Hole was plugged to above 5300' on 11-30-83 and temporarily abandoned. On 8-23-84 tagged cement at 5195'. On 8-24-84, Halliburton spotted 180 sack plugs of Howcolite cement at each depth of 5195', 4358', 3521', 2684', and 1847', a 165 sack Howcolite plug at 1010' and a 75 sack plug of Class A cement at 210'.

13 3/8" and 9 5/8" casings capped with 1/2" plate 3' below grade.

(USE REVERSE SIDE IF NEEDED)

Were tools, tubing, casing, etc., lost or left  
in the hole before or during plugging?

☐ YES

☒ NO

If yes, give details:

GEOLOGICAL SURVEY

Did a Service Company pump mud,  
spot cement, or set bridge plugs?

☒ YES

☐ NO

If yes, give name and address:

Halliburton, 500 Mt. Pleasant

Was the well plugged by a Company or  
contractor other than Owner or Operator?

☐ YES

☒ NO

If yes, give name and address:

Permits & Bonding Unit

Representatives of Owner, Operator, Company, or Contractor who witnessed plugging

C. Cookingham

CERTIFICATE

Donald D. Metzger

of Kalium Chemicals

(company)

I state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction and that the facts stated herein are true, correct and complete to the best of my knowledge.

SIGNATURE

ADDRESS

TITLE

11126 140th Ave., Hersey, MI Resident Manager

FINAL INSPECTIONS

DEPARTMENT REPRESENTATIVE

DATE

DEPARTMENT REPRESENTATIVE

DATE

**MINERAL WELL COMPLETION REPORT**  
TO BE FILED WITH THE SUPERVISOR WITHIN 60 DAYS  
AFTER COMPLETION OF WELL (ACT 315, P.A. 1969)

SUBMIT IN  
TRIPLICATE

AMENDED 12-9-87

NAME OF OWNER OR OPERATOR PPG Oil & Gas., Inc.		ADDRESS OF OWNER OR OPERATOR 2258 Enterprise Drive Mt. Pleasant, MI 48858	
NAME OF DRILLING CONTRACTOR James Bigard Drilling Company		ADDRESS OF DRILLING CONTRACTOR 1315 S. Mission Mt. Pleasant, MI 48858	
WELL NAME <u>Jensen</u>	WELL NUMBER <u>1-2</u>	PERMIT NUMBER <u>1245-831-354</u>	
LOCATION SE SE NE	SECTION 2	TWP 16N	RANGE 9W
TOWNSHIP Grant	COUNTY Mecosta		
FOOTAGE 330 Ft. from <u>South</u> Line and <u>330</u> Ft. from <u>East</u> Line of quarter section N or S E			
DATE DRILLING COMMENCED 11-3-83	DATE DRILLING COMPLETED 11-28-83	DATE WELL COMPLETED -----	
FORMATION COMPLETED IN Cabot Head	TOTAL DEPTH 8085	ELEVATION KB 1114	TYPE OF WELL Hole RT 1113 GN 1098
ROTARY TOOLS From 0 Feet to 8085 Feet		CABLE TOOLS From _____ Feet to _____ Feet	

**WELL CASING RECORD**

TUBING AND CASING DATA				CEMENTING DATA			PERFORATIONS OR OPEN HOLE		
SIZE	LB./FT.	GRADE	DEPTH	SACKS	TYPE	STAGING DEPTH(S)	NO. HOLES	FROM	TO
24"			132	DP					
13 3/8"			848	900					
9 5/8"			5408	1600					

**WATER ZONES**

**WIRE LINE LOGS RUN**

FORMATION	FROM	TO	AMOUNT	SERVICE COMPANY	TYPE LOG	INTERVAL LOGGED	COPY TO SURVEY
(Fresh)				Schlumberger	LDT-CNL-GR	200 - 8084	Yes
					DLL-MLL	3250 - 8084	Yes
					Sonic	200 - 8084	Yes

**FRACTURE OR ACID TREATMENT**

**SOLUTION MINING**

DATE	FROM	TO	QUANTITY	NAME AND NUMBER OF INJECTION AND TARGET WELL - DISTANCE APART

The information in and attached to this report is complete and correct

SIGNATURE <i>Donald D. Metzger</i> Donald D. Metzger	TITLE Kalium Chemicals Resident Manager	DATE 12-9-87
------------------------------------------------------------	-----------------------------------------------	-----------------

GIVE COMPLETE FORMATION RECORD ON REVERSE SIDE

**FORMATION RECORD**  
(ATTACH ADDITIONAL SHEETS IF NECESSARY)

<b>ELEVATION USED:</b> <input type="checkbox"/> KB <input type="checkbox"/> RT <input type="checkbox"/> RF <input type="checkbox"/> GR	<b>GEOLOGIST NAME:</b>	<b>TOPS TAKEN FROM:</b> <input type="checkbox"/> SAMPLE LOG <input type="checkbox"/> ELECTRIC LOG
-------------------------------------------------------------------------------------------------------------------------------------------	------------------------	------------------------------------------------------------------------------------------------------

FROM	TO	FORMATION (TYPE, COLOR, ETC.)	FROM	TO	FORMATION (TYPE, COLOR, ETC.)

IF WELL WAS CORED, ATTACH CORE DESCRIPTION AND ANALYSIS

**LIST ATTACHMENTS:**

**GEOLOGICAL SURVEY USE ONLY**

REVIEWED BY

DATE OF COMPLETION

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

FEB 3 1984

MINERAL WELL PLUGGING RECORD

File in DUPLICATE Within 30 Days After Plugging is Completed

PERMIT NUMBER

37188

DATE

1/12/84

OWNER OR OPERATOR

PPG Oil & Gas Company, Inc.

ADDRESS

2258 Enterprise Drive, Mt. Pleasant, MI 48858

WELL NAME

Jensen

WELL NUMBER

1-2

WELL LOCATION

SE 1/4 SE 1/4 NE 1/4 SEC. 2 T. 16N R. 9W

TOWNSHIP

Grant

COUNTY

Mecosta

TYPE OF WELL (Brine Disposal Storage or Test)

Dry Hole

TOTAL DEPTH

8085

FORMATION

Cabot Head

DATE PLUGGING STARTED

11-30-83

DATE PLUGGING COMPLETED

11-30-83

WAS PERMISSION OF DEPT. OF NATURAL RESOURCES  
OBTAINED BEFORE PLUGGING BEGAN?

☒ YES

☐ NO

NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING

Ben Gunning

CASING SIZE	WHERE SET	AMOUNT RECOVERED	SHOT OR RIPPED	TYPE OF BRIDGES OR PLUGS	DEPTH PLACED	NUMBER SACKS
24"	132	None		Cement	8085-5885	450
13 3/8"	848	None		Cement	5885-5300	290
9 5/8"	5408	None				

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

Ran drill pipe and set 3 150 sx plugs from total depth to 5885. Set 290 sx from 5885 to 5300 and bolted temperature plate on wellhead. Wellhead abandoned.

FEB - 6 1984

(USE REVERSE SIDE IF NEEDED)

Were tools, tubing, casing, etc., lost or left  
in the hole before or during plugging?

☐ YES

☒ NO

If yes, give details:

Did a Service Company pump mud  
spot cement, or set bridge plugs?

☒ YES

☐ NO

If yes, give name and address:

Halliburton

Was the well plugged by a Company or  
Contractor other than Owner or Operator?

☐ YES

☒ NO

If yes, give name and address:

Representatives of Owner, Operator, Company, or Contractor who witnessed plugging

Marvin Woods

CERTIFICATE

William E. Booker

of Strickler Geological Services, Inc. (company)

I state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction, and that the facts stated herein are true, correct and complete to the best of my knowledge.

SIGNATURE

ADDRESS

TITLE

1425 S. Mission, Mt. Pleasant,

Geologist

FINAL INSPECTIONS

MI

DEPARTMENT REPRESENTATIVE

DATE

DEPARTMENT REPRESENTATIVE

DATE

MINERAL WELL COMPLETION REPORT  
TO BE FILED WITH THE SUPERVISOR WITHIN 60 DAYS  
AFTER COMPLETION OF WELL (ACT 315, P.A. 1969)

FEB 3

7004

SUBMIT IN  
TRIPLICATE

NAME OF OWNER OR OPERATOR PPG Oil & Gas Co., Inc.		ADDRESS OF OWNER OR OPERATOR 2258 Enterprise Drive Mt. Pleasant, MI 48858	
NAME OF DRILLING CONTRACTOR James Bigard Drilling Company		ADDRESS OF DRILLING CONTRACTOR 1315 S. Mission Mt. Pleasant, MI 48858	
WELL NAME Jensen	WELL NUMBER 1-2	PERMIT NUMBER 37188	
LOCATION SE SE NE	SECTION 2	TWP. 16N	RANGE 9W
TOWNSHIP Grant	COUNTY Mecosta		
FOOTAGE 330 Ft from South Line and 330 Ft from East Line of quarter section N or S E or W			
DATE DRILLING COMMENCED 11-3-83	DATE DRILLING COMPLETED 11-28-83	DATE WELL COMPLETED -----	TYPE OF WELL Dry Hole
FORMATION COMPLETED IN Cabot Head	TOTAL DEPTH 8085	ELEVATION KB 1114	RB RT RF GN 1113 1098
ROTARY TOOLS From 0 Feet to 8085 Feet		CABLE TOOLS From                      Feet to                      Feet	

WELL CASING RECORD

TUBING AND CASING DATA				CEMENTING DATA			PERFORATIONS OR OPEN HOLE		
SIZE	LB./FT.	GRADE	DEPTH	SACKS	TYPE	STAGING DEPTH(S)	NO. HOLES	FROM	TO
24"			132	DP					
13 3/8"			848	900					
9 5/8"			5408	1600					

WATER ZONES

WIRE LINE LOGS RUN

FORMATION	FROM	TO	AMOUNT	SERVICE COMPANY	TYPE LOG	INTERVAL LOGGED	COPY TO SURVEY
(Fresh)				Schlumberger	LDT-CNL-GR	200 - 8084	Yes
					DLL-MLL	3250 - 8084	Yes
					Sonic	200 - 8084	Yes

FRACTURE OR ACID TREATMENT

GEOLOGICAL SURVEY SOLUTION MINING

DATE	FROM	TO	QUANTITY	NAME AND NUMBER OF INJECTION AND TARGET WELL - DISTANCE APART
				FEB - 6 1984

The information in and attached to this report is complete and correct.

SIGNATURE <i>William E Book</i>	TITLE Geologist	DATE 1/12/84
------------------------------------	--------------------	-----------------

GIVE COMPLETE FORMATION RECORD ON REVERSE SIDE

STATE OF MICHIGAN



JAMES J. BLANCHARD, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING  
BOX 30028  
LANSING, MI 48909

RONALD O. SKOOG, Director

NATURAL RESOURCES COMMISSION

THOMAS J. ANDERSON  
R. CAROLLO  
OB A. HOEFER  
EPHEN F. MONSMA  
HILARY F. SNELL  
PAUL H. WENDLER  
HARRY H. WHITELEY

October 26, 1983

Mr. Donald P. Smith  
PPG Oil & Gas Co., Inc.  
2258 Enterprise Drive  
Mt. Pleasant, MI 48858

Dear Mr. Smith:

Enclosed is Mineral Well Permit #1245-831-354 to drill and abandon a mineral exploration well in the SE $\frac{1}{4}$ , SE $\frac{1}{4}$ , NE $\frac{1}{4}$ , Sec. 2, T16N-R9W, Grant Twp., Mecosta County. This permit was issued under the provisions of the "Mineral Well Act", Act 315 PA 1969, as amended.

It is my understanding that this well is also being permitted under Act 61, Oil and Gas Act. This was not indicated in your covering letter. In the future please alert us to the fact that simultaneous permitting is being requested.

Records of the well drilled under this permit are due within 60 days of completion. For information on contents of these records, please refer to Rule 72(a). These records and supporting information will be held confidential as per Section 17(5) and Rule 73 of the Act.

Whenever possible, please indicate county, township and range on each record sent into our office.

Thank you for your cooperation with us on these matters.

Sincerely,

A.J. Rarick, Acting Chief  
Mineral Well Unit  
Geological Survey Division

AJR:bb  
Enclosures

No. 11358

**MINERAL WELL PERMIT**  
For a Test Well(s)

Permit No. 1245-831-354	
Date Issued 10-26-83	Date Expires 04-26-83

Permission is hereby granted to PPG Oil & Gas Co., Inc. (name)  
2258 Enterprise Drive, Mt. Pleasant, MI 48858 (address)

to drill and abandon (type of operation) mineral exploration (type of test well(s))  
to be located in SE $\frac{1}{4}$ , SE $\frac{1}{4}$ , NE $\frac{1}{4}$ , Sec. 2, T16N-R9W, Grant Twp., Mecosta County

<u>Jensen</u> (well name)	<u>1-2</u> (well number)	<u>Niacaran</u> (formation)	<u>8000</u> (intended depth)	<u>RB</u> <u>RF</u> <u>RT</u> <u>GN</u> (elevation)
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**SPECIAL INSTRUCTIONS:**

HOLE TO BE PLUGGED FROM TOP TO BOTTOM WITH NEAT CEMENT.

Permit is subject to the provisions and requirements of Act 315 PA 1969, As Amended, and rules, requirements, or orders issued by the Supervisor of Mineral Wells and the Department of Natural Resources.

SUPERVISOR OF MINERAL WELLS

By: A.J. Farick  
Title: A.J. Farick, Acting Chief  
Address: Mineral Well Unit  
Geological Survey Division  
Dept. of Natural Resources  
Box 30028, Lansing, MI 48909

Please address all notifications, correspondence, and records to:

Telephone: 517/373-9239

— NOTICE —

1. This permit is issued on the basis of the approved program outlined in the application. No changes or alterations are to be made without the permission and approval of the Supervisor of Mineral Wells or his authorized representative.
2. This permit, or a copy thereof, shall be posted at a conspicuous place at the well location or be in the possession of the driller.
3. It is further made a requirement of this permit that the applicant (or contractor) give notice to the public utilities in accordance with Act 53, Public Acts of 1974, Compiled Laws 460.701 to 460.718 and comply with each of the requirements of the act.
4. An unusual, unexpected, or difficultly controllable large volume of oil, gas, brine or flowing fresh water or a condition hazardous to public health, safety, or waters of the state shall be reported immediately to the Supervisor.

Distribution: Linen-applicant—2-Lansing—3-field—4-applicant.



20. continued

c. How are salt cuttings to be handled? Cuttings will be dissolved, and brine circulated to the reserve pit.

d. Are all fluids in the lined pit to be removed and disposed of in approved method? ☒ Yes ☐ No If no, explain: \_\_\_\_\_

e. Are drilling muds and cuttings to be removed or totally encapsulated within the folded over liner and/or an additional impermeable cover as needed, for burial at four feet below grade or deeper? ☒ Yes ☐ No If no, explain: \_\_\_\_\_

f. Is approval of the encapsulation to be received from the District Geologist? ☒ Yes ☐ No If no, explain: \_\_\_\_\_

g. During well completion and test procedures, all fluids must be contained in steel tanks and transported to approved facilities for disposal. Comments: \_\_\_\_\_

Other Department personnel contacted? ☒ Yes ☐ No Comments: See item #16

21. Site Restoration will be addressed upon well completion or site abandonment. At that time the District Geologist will develop specifications in keeping with the State Land Manager's or Surface Owner's objectives. \_\_\_\_\_

ON THE BASIS OF THE REVIEW FINDINGS:

I ☒ DO ☐ DO NOT RECOMMEND ISSUANCE OF A PERMIT TO DRILL THIS SITE.

DISTRICT GEOLOGIST'S COMMENTS: \_\_\_\_\_

GEOLOGICAL SURVEY DIVISION:

BY: [Signature]

(signature)

10-21-83

(date)

LAND MANAGER'S COMMENTS: \_\_\_\_\_

LAND MANAGER (If State Surface):

(signature)

(date)

REGIONAL DIRECTOR'S COMMENTS: \_\_\_\_\_

REGIONAL DIRECTOR:

BY:

(signature)

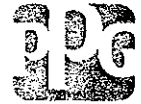
(date)

This document paid for with State funds

PPG Oil & Gas Co., Inc.

A Subsidiary of PPG Industries, Inc.

2258 Enterprise Drive Mt. Pleasant, Michigan 48858 (517) 773-3949



October 19, 1983

Mr. Wayne T. Todd  
Regional Mineral Wells Geologist  
Michigan Department of Natural Resources  
Clare Avenue  
Clare, MI 48617

Mr. Ty Black  
Assistant to the Regional Geologist  
Michigan Department of Natural Resources  
P.O. Box 128  
Roscommon, MI 48653

Gentlemen:

Attached is a copy of an application for a permit to drill a Mineral Test Well in Grant Township, Mecosta County. This application was submitted in Lansing on October 19, 1983. I would appreciate your early handling of the field review in order to expedite the issuance of the permit.

Please note that the Mineral Well Act provides confidential treatment of information related to the permit and all data obtained from the well.

Please call me at (517) 773-3949 if we can be of assistance.

Sincerely,

*Donald D. Metzger*

Donald D. Metzger  
Director, Exploration  
& Michigan Operations

DDM/blb  
Attachments

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

APPLICATION FOR A MINERAL WELL PERMIT

To Drill, Operate, Convert, or Rework  
a Brine, Storage, Disposal, or Test Well.

By Authority of Act 315, P. A. 1969

1 DATE OF APPLICATION 10-18-83	2 FEE ENCLOSED \$1.00
3 APPLICATION TO Drill	
4. TYPE MINERAL WELL D-5 (Test Well)	5. WELL DESIGNATION Jensen 1-2
6. LOCATION: SE/4 of the SE/4 of the NE 1/4 SEC 2 T 16N R 9W	
7. TOWNSHIP Grant	8 COUNTY Mecosta

9 APPLICANT PPG Oil & Gas Co., Inc.		10. TELEPHONE (517) 773-3949	
11. ADDRESS (Street City, State) 2258 Enterprise Drive, Mt. Pleasant, MI		12. ZIP CODE 48858	
13 SURETY OR SECURITY COMPANY Hartford Accident & Indemnity Co.	14. TYPE <input type="checkbox"/> SINGLE <input checked="" type="checkbox"/> BLANKET	15 AMOUNT \$25,000.00	16 BOND NO 4506230
17 OWNER OR SURFACE RIGHTS Philip C. Jensen	18 OWNER OR MINERAL RIGHTS Philip C. Jensen		
19 DRILLING CONTRACTOR T. D. Provins	20 ADDRESS P.O. Box 642, Mt. Pleasant, MI 48858		21 TELEPHONE (517) 773-6946
22. TYPE DRILLING TOOLS <input type="checkbox"/> CABLE <input checked="" type="checkbox"/> ROTARY <input type="checkbox"/> COMBINATION	23 FORMATION Niagaran		24. INTENDED DEPTH 8,000'
25 PROJECT ENGINEER OR GEOLOGIST D. D. Metzger	26 ADDRESS 2258 Enterprise Drive, Mt. Pleasant, MI 48858		27. TELEPHONE (517) 773-3949

28 PROGRAM OF DRILLING, CONVERTING, REWORKING, CASING, CEMENTING, COMPLETING, OPERATING, AND MONITORING.  
(See appropriate instruction sheet. Attach 3 copies of proposed program - including but not necessarily limited to information requested in the instruction sheet.)

CASING PROGRAM:  
Size Depth Cement

Exhibits 1, 2, 3 enclosed

GEOLOGICAL SURVEY

OCT 20 1983

MINERAL WELL SECTION

INSTRUCTION SHEET NO.		
Type of Well	Drill-New	Rework*
Brine	D-1	R-1
Storage	D-2	R-1
Disposal	D-3	R-1
Solution Mining	D-4	R-2
Test Well	D-5 <input checked="" type="checkbox"/>	R-1
*Rework, Deepen, or Convert to New Use		

THERE WILL BE NO CHANGES IN THE PROGRAM OUTLINED IN THIS APPLICATION WITHOUT APPROVAL OF THE SUPERVISOR OF MINERAL WELLS OR HIS AUTHORIZED REPRESENTATIVE.

29 ADDRESS CORRESPONDENCE AND PERMIT TO: PPG Oil & Gas Co., Inc., 2258 Enterprise Drive, Mt. Pleasant, MI 48858	30. TELEPHONE (517) 773-3949
--------------------------------------------------------------------------------------------------------------------	---------------------------------

MINERAL WELL SECTION USE ONLY

STATUS OF BOND

APPLICATION APPROVED BY

PERMIT NUMBER

DATE ISSUED

ISSUED BY

DISTRIBUTION:  
White - Lansing  
Canary - Field  
Pink - Applicant

The Applicant agrees to comply with provisions and requirements of Act 315, P.A. 1969, and asserts that the information on this application and attached report is true and correct.

SIGNATURE (APPLICANT/AUTHORIZED REP)

DATE

NAME (TYPED)

Donald P. Smith

TITLE

Exploration Engineer

FOR CASHIER'S USE ONLY

R 7500 2/73

PPG Oil & Gas Co., Inc.

A Subsidiary of PPG Industries, Inc

2258 Enterprise Drive Mt. Pleasant, Michigan 48858 (517) 773-3949



October 19, 1983

Mr. Al Rarick  
Department of Natural Resources  
Geological Survey Division  
P. O. Box 30028  
Lansing, MI 48909

Dear Mr. Rarick:

Re: PPG Oil & Gas Co., Inc. Standard Casing and Cementing  
Procedures

Listed below are PPG Oil & Gas Co., Inc. standard casing and cementing procedures:

1. Drive 24 pipe as deep as possible. This allows us to set 20" conductor inside and lower if trouble occurs with washout under conductor pipe while drilling surface hole.
2. Drill 17 1/2" hole to base of drift or to a firm footing as determined by geologist from samples.
3. Run 13 3/8" S.T.C. 48# Seamless H-40 casing equipped with Texas pattern weld on shoe. A float collar is set 30', or one joint, off bottom. The lower 5 joints of casing are strapped across collar in either two or three sectors. Top and bottom cement plugs with no centralizer as recommended by cementing company (see attached).
4. We also run a cement basket approximately 50' below surface, making sure cement is circulated back to surface.
5. We then drill 12 1/4" hole into Bass Islands formation or the Amherstburg if local drilling shows no lost circulation zones in the Bois Blanc and set 9 5/8" L.T.C. 40# N-80 grade pipe with a guide shoe on bottom with float collar first joint up and all bottom 6 joints secured with Weld-A or Baker Lok or some similar material.
6. Centralizers are run per cementer's recommendation attached.
7. For both the surface and intermediate casings, the lower joints of casing are roughened unless they appear rusty as this provides a much better bond for cement.

Sincerely,

A handwritten signature in dark ink, appearing to read 'D. Smith', written over a horizontal line.

Donald P. Smith  
Exploration Engineer

DPS/blb  
Attachment

Exhibit #1

Surface Casing (13 3/8" in 17 1/2" hole @ 750')

- A. Use insert float and Texas Pattern Shoe and lock to shoe joint with thread lock.
- B. No centralizers
- C. Circulate hole a minimum of one complete circulation
- D. Do not reciprocate casing
- E. Run bottom (red) wiper plug. Do not use if carrying LCM in cement.
- F. Pump 70 bbls. fresh water ahead of cement
- G. Cement with:
  - 1. 475 sx 50/50 Poz., 6% total gel, 3%  $\text{CaCl}_2$   
1.54 ft<sup>3</sup>/sk, 13.3#/gal, 7.66 gals/sk
  - 2. 200 sx Class "A", 3%  $\text{CaCl}_2$   
1.18 ft<sup>3</sup>/sk, 15.6#/gal, 7.66 gals/sk

Intermediate Casing (9 5/8" in 12 1/4" hole @ 5100')

Recommended Procedure:

- A. Use float collar and guide shoe and lock to shoe joint with Halliburton Weld-A
- B. Run one centralizer 10' above guide shoe and four more at every other collar spacing.
- C. Circulate hole a minimum of one complete circulation and until the drag stabilizes.
- D. Reciprocate casing while circulating and cementing. Stop reciprocation just prior to bumping top plug.
- E. Run bottom (red) wiper plug. Do not use if carrying LCM in cement.
- F. Pump 30 bbls. fresh water ahead of cement.
- G. Cement with enough cement from caliper log to bring cement to surface on all intermediate casing strings.
- H. Run top (black) wiper plug.
- I. Displace with fresh water.

Casing Equipment: (9 5/8")

Regular guide shoe, float collar with auto fill, Halliburton weld-A (2), Centralizers (5)

PPG Oil & Gas Co., Inc.

A Subsidiary of PPG Industries, Inc

2258 Enterprise Drive Mt. Pleasant, Michigan 48858 (517) 773-3949



October 19, 1983

Mr. Al Rarick  
Department of Natural Resources  
Geological Survey Division  
4th Floor, Mason Building  
P. O. Box 30028  
Lansing, MI 48909

Dear Mr. Rarick:

Subject: PPG Oil & Gas Co., Inc. Testing Program

The test well covered by this application is being drilled into the top of the Niagaran formation to approximately 8,000'. The primary objective is evaluation of the potash mineralization of the A-1 Evaporite, which occurred in the interval -7,579' to -7,931' in the Freudenburg 1-31 well located in the SE/4 NE/4 NE/4 of Section 31, T17N, R8W, Osceola County, Michigan.

The testing program will consist of cutting 4" cores through the anticipated potash mineralized section. Then gamma ray, neutron and other geophysical logs will be run at total depth.

Geophysical logs will also be run from the base of the surface casing to total depth. Sample cuttings will be retained and sample descriptions will be submitted with the plugging record. Potential disposal horizons will be drill stem tested.

Sincerely,

A handwritten signature in cursive script that reads 'Donald D. Metzger'. The signature is written in dark ink.

Donald D. Metzger  
Director, Exploration  
& Michigan Operations

DDM/blb

Exhibit #2

PPG Oil & Gas Co., Inc.

A Subsidiary of PPG Industries, Inc

2258 Enterprise Drive Mt. Pleasant, Michigan 48858 (517) 773-3949



October 19, 1983

Mr. Al Rarick  
Department of Natural Resources  
Geological Survey Division  
4th Floor, Mason Building  
P.O. Box 30028  
Lansing, MI 48909

Re: Casing Removal and Plugging

Dear Mr. Rarick:

Upon completion of the coring and logging of the test well covered by attached permit application the well may be abandoned and plugged. If not abandoned, change of status will be requested at a later date.

Plugging will consist of running open end drill pipe to T.D. and setting continuous cement plugs to surface. The casing will be cut off at least 3 feet below surface and a 1/2" steel plate welded over the top of surface casing stub.

The cellar will be removed and backfilled according to D.N.R. specifications.

Sincerely,

A handwritten signature in dark ink, appearing to read 'D. Smith', written over a horizontal line.

Donald P. Smith  
Exploration Engineer

DPS/blb


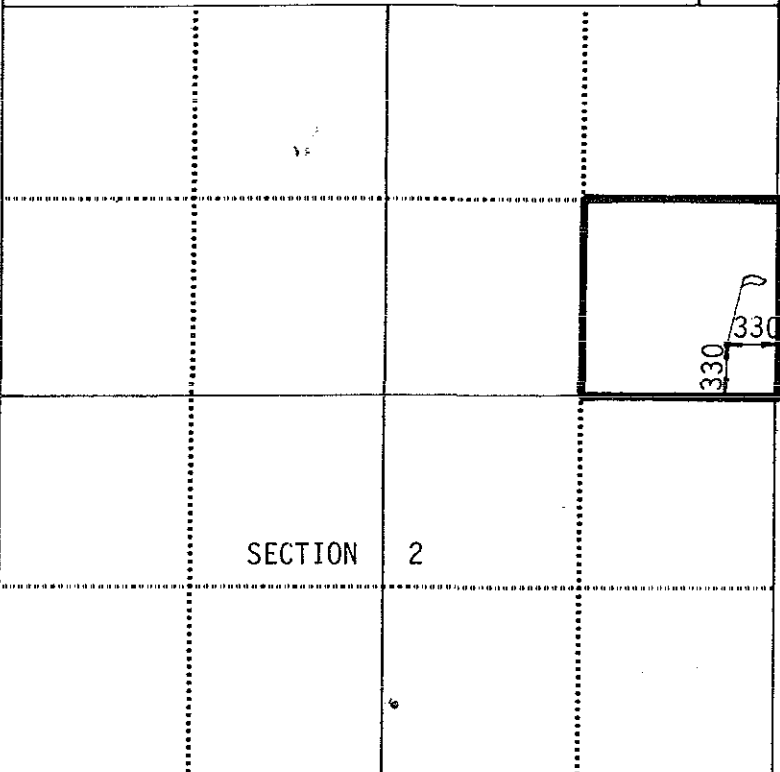
Exhibit #3

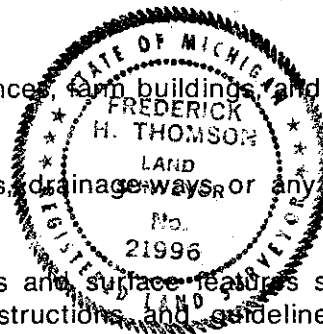
STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

## SURVEY RECORD OF WELL LOCATION

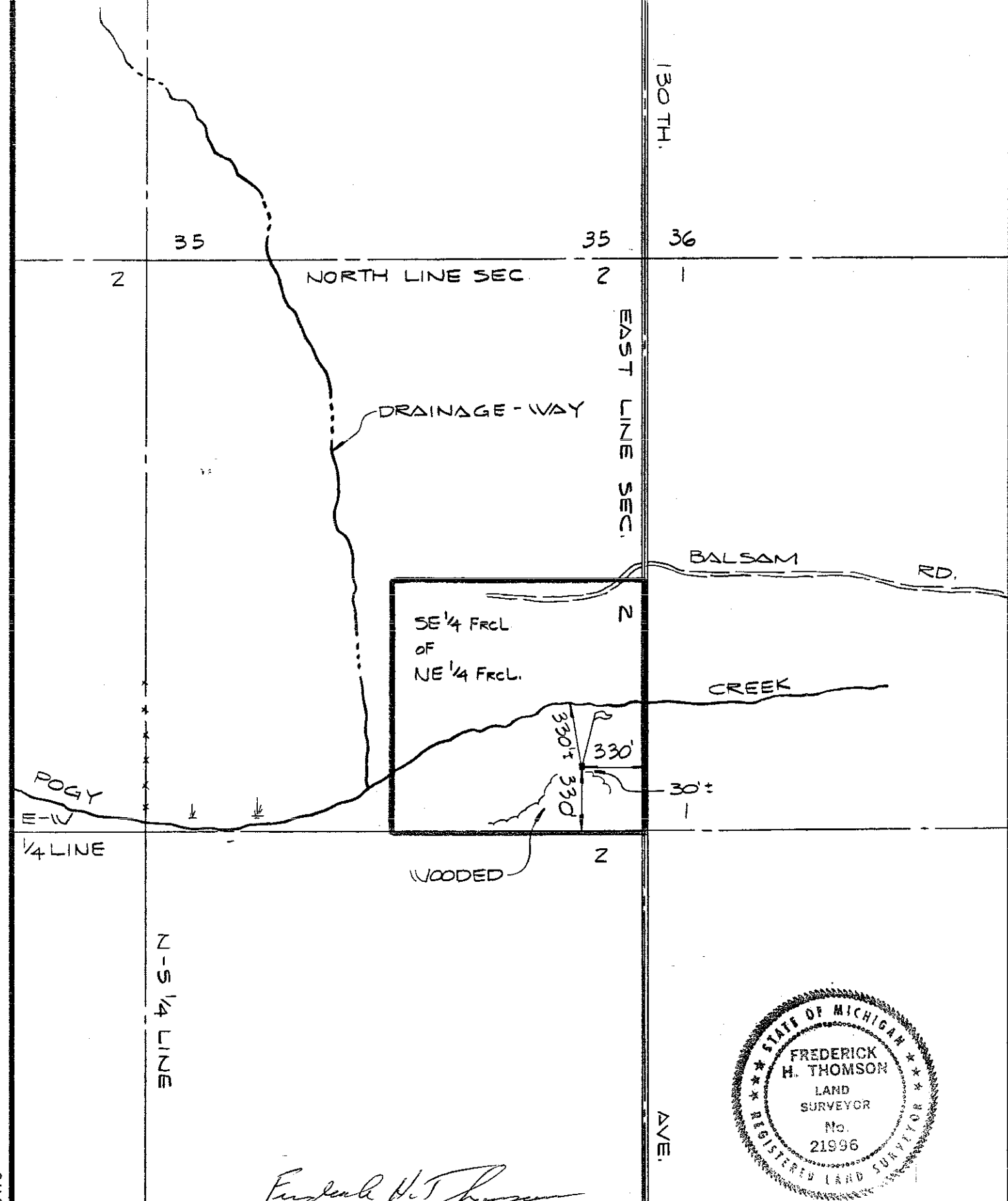
(Submit five copies with Application for Permit to Drill a Well for Oil or Gas,  
Brine Disposal, Hydrocarbon Storage or Secondary Recovery)

83368

LESSEE (OWNER OF LEASE RIGHTS) <b>P.P.G. Oil &amp; Gas Company, Inc.</b>				WELL NO. <b>1-2</b>	
LESSOR (OWNER OF MINERAL RIGHTS) <b>Phillip Jensen</b>				(Jensen # 1-2)	
LOCATION SE      ¼ OF      SE      ¼ OF      NE      ¼ SECTION      2      T. 16 N      R. 9 W					
TOWNSHIP <b>Grant</b>			COUNTY <b>Mecosta</b>		
PLAT BELOW REPRESENTS ONE FULL SECTION (1 Mile Square)			<div style="text-align: center;">  </div> <ol style="list-style-type: none"> <li>Outline drilling unit and spot well location on plat at left. Where drilling unit crosses section lines, divide the plat into an east half and a west half <b>OR</b> a north half and a south half (which ever applies). Outline the unit and locate the well in two directions from <b>NEAREST</b> quarter section and unit lines.</li> <li>Location of well in two directions from <b>NEAREST</b> quarter section and unit lines is:  <div style="margin-left: 20px;"> <u>330</u> ft. from <u>South</u> line of Quarter Section  <small>(north-south)</small>  <u>330</u> ft. from <u>East</u> line of Quarter Section  <small>(east-west)</small>  <u>330</u> ft. from <u>South</u> line of unit  <small>(north-south)</small>  <u>330</u> ft. from <u>East</u> line of unit  <small>(east-west)</small> </div> </li> <li>Describe wellsite marker. Show or describe access route if it is not readily accessible.  <u>Wellsite is marked with a painted wood stake. Site can be reached from East off of 130th Ave. See supplemental plat.</u> </li> </ol>		
					
SECTION      2					
(Scale of Plat — 1 inch equals 1320 ft.)					
<p>4. ON SEPARATE PLAT OR PLOT PLAN:</p> <p>A. Locate, identify, and show distances to all roads, power lines, residences, farm buildings, and other structures within 300 feet of the stake;</p> <p>B. Locate, identify, and show distances to all lakes, streams, swamps, drainage ways or any other surface water features within 1320 feet of the stake.</p> <p>5. In an ENVIRONMENTAL IMPACT ASSESSMENT describe all structures and surface features shown detailing plans for hazards prevention and erosion control (See instructions and guidelines for preparation of an environmental impact assessment).</p>					
NAME OF INDIVIDUAL WHO SURVEYED WELL SITE <i>Frederick H. Thomson</i> Frederick H. Thomson, LS# 21996		DATE 10-18-83		TITLE Surveyor	
ADDRESS J. L. WILCOX & ASSOCIATES, INC.      7230 North US 131      Manton, MI 49663					
I CERTIFY THE ABOVE INFORMATION IS COMPLETE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF					
SIGNATURE (LESSEE OR AUTHORIZED REPRESENTATIVE) <i>D. Smith</i>		ADDRESS (IF DIFFERENT THAN LESSEE)		DATE (MONTH, DAY, YEAR)	







*Frederick H. Thomson*



SUPPLEMENTAL PLAT: JENSEN 1-2, SECTION 2, T16N-R21W, GRANT TOWNSHIP, MECOSTA COUNTY MICHIGAN	DATE 10-13-83	<b>J.L. WILCOX &amp; ASSOCIATES, INC.</b> Engineers and Surveyors 7230 N. U.S. - 131 • Manton, Michigan 49863		
	DRN R.M.			
CLIENT: P.P.G. OIL & GAS CO. INC.	CHD ACF	NOTES F.B. 180 PG. 13	SHEET 1 OF 1	JOB NO. 83368
	SCALE V.I.: 660'			

BOOKING 44-122 48478

**b. Pilarski 1-12, Permit #00340**

DEPARTMENT OF NATURAL RESOURCES  
Geological Survey Division

REQUEST FOR CHANGE OF OWNERSHIP OF A PERMIT  
(Submit all copies)

Please Change:

Permit No. 1242-831-354 Type Well Mineral Test Field Name Hersey-Evart

Owned by PPG Oil & Gas Co., Inc.

Address 2258 Enterprise Drive, Mt. Pleasant, MI 48858 (517) 773-3949  
(street) (town) (state) (zip) (phone)

for Pilarski 2N 1242-831-354 No. 1-12 located in the C 1/4 NE 1/4 NE 1/4

section 12, T. 16N, R. 9W, Grant Township, Mecosta County,

to PPG Industries, Inc.

(acquiring owner-complete names please)

All operating rights are discharged by (us) (me).

(Owner)

(Representative)

(Signature)

(Date)

PPG Oil & Gas Co., Inc.-Donald D. Metzger

Donald D. Metzger 4-17-84

THE SUPERVISOR IS PROHIBITED BY STATUTE FROM ISSUING A PERMIT TO ANY PERSON WHO IS NOT IN COMPLIANCE WITH THE PROVISIONS OF THE ACT, THE RULES, OR THE ORDERS OF EITHER THE SUPERVISOR OR THE NATURAL RESOURCES COMMISSION. ELIGIBILITY FOR PERMITS IS CONDITIONED ON COMPLIANCE WITH SUCH RULES AND ORDERS IN A DILIGENT MANNER AND IN ACCORDANCE WITH ACCEPTED OIL FIELD PRACTICE.

(We) (I) have acquired the well under this permit and assume full responsibility for drilling, operation, and abandonment in conformity with the law, regulations and orders issued by the Supervisor of Wells. The bond(s) required is attached or already on file.

PPG Industries, Inc.

(acquiring owner-complete names please)

Address 2258 Enterprise Drive, Mt. Pleasant, MI 48858 (517) 773-3949  
(street) (town) (state) (zip) (phone)

All operating rights and responsibilities are assumed by (us) (me).

(Owner)

(Representative)

(Signature)

(Date)

PPG Industries, Inc. - Donald D. Metzger

Donald D. Metzger 4-17-84

THE DEPARTMENT OF NATURAL RESOURCES

Approved. H. Raich

(Signature)

5/3/84  
(Date)

DNR USE ONLY

White, Lansing

Yellow, Acquiring Owner

Pink, Selling Owner

Blue, Field

R-7214 (Rev. 10-79)

R 299.1105. Transfer of permits

Rule 105.

(b) Change of ownership of a well

Should the person who has obtained a permit to drill dispose of his interest in the well to a new owner before drilling is commenced, while the well is being drilled, or after the well has been completed, a notice of the change of ownership and a request for the transfer of the permit to the new owner shall be submitted to the supervisor on forms prescribed by him. The transfer of the permit may be approved on receipt of a properly-prepared request, including the signatures of the operator of record and the acquiring operator, and the required surety bond of the acquiring operator.

Should the owner of record or the acquiring operator fail, neglect, or refuse to file a notice of change of ownership and request the transfer of a permit for a producible well, the supervisor may require suspension of production from the well until the request for transfer has been filed and approved.

Should the owner of record be under notice because of unsatisfactory conditions on the lease involved with the transfer of a permit, the supervisor may require suspension of production from the well on said lease until:

(1) The owner of record has corrected said unsatisfactory conditions and the permit has been transferred to the new owner; or until

(2) The acquiring operator by written agreement with the supervisor has corrected said unsatisfactory conditions and the permit has been transferred as provided herein.

A permit for a well which has not been drilled, or for a well which is being drilled, may not be transferred to a person who is not in compliance with the statutes, rules, regulations and orders as provided in rule 104.

R 299.1105a. Suspension of production on default

Rule 105a. Should the owner of record sell or dispose of a well without filing a notice of change of ownership and a request for transfer of the permit, the supervisor may require suspension of production from the well, including removal or sale of oil from the lease, until correction has been made of all unsatisfactory lease conditions and transfer of the permit has been completed as provided in rule 105 (b).

R 299.1106. Surety bond; required

Rule 106. A person who drills a well as provided in rule 101, or who acquires a well or wells as provided in rule 105, shall file a surety bond with the supervisor, on a form provided by the supervisor, which has been executed by a responsible surety company authorized to do business in the state of Michigan.

NOTE: Cash may be deposited in lieu of a surety bond.

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

MINERAL WELL PLUGGING RECORD

File in DUPLICATE Within 30 Days After Plugging is Completed

PERMIT NUMBER

1242-831-354

DATE

2/2/84

OWNER OR OPERATOR

PPG Oil & Gas Co., Inc.

ADDRESS

2258 Enterprise Drive, Mt. Pleasant, MI 48858

WELL NAME

Pilarski

WELL NUMBER

1-12

WELL LOCATION

C ¼ NE ¼ NE ¼ SEC. 12 T. 16N R. 9W

TOWNSHIP

Grant

COUNTY

Mecosta

TYPE OF WELL (Brine Disposal Storage or Test)

Test Well

TOTAL DEPTH

7937

FORMATION

Niagaran

DATE PLUGGING STARTED

11-18-83

DATE PLUGGING COMPLETED

11-18-83

WAS PERMISSION OF DEPT. OF NATURAL RESOURCES  
OBTAINED BEFORE PLUGGING BEGAN?

☒ YES

☐ NO

NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING

Ben Gunning

CASING SIZE	WHERE SET	AMOUNT RECOVERED	SHOT OR RIPPED	TYPE OF BRIDGES OR PLUGS	DEPTH PLACED	NUMBER SACKS
24"	45	----		Cement	7937-6015	530
13 3/8"	946	----		Cement	6015-5590	290
9 5/8"	5480	----				

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

Ran drill pipe open ended to 7937 and spotted 530 sx, pulled drill pipe to 6015 and spotted 290 sx, pulled drill pipe and waited on cement.

(USE REVERSE SIDE IF NEEDED)

Were tools, tubing, casing, etc., lost or left  
in the hole before or during plugging?

☐ YES

☒ NO

If yes, give details:

Did a Service Company pump mud,  
spot cement, or set bridge plugs?

☒ YES

☐ NO

If yes, give name and address:

Halliburton

Was the well plugged by a Company or  
Contractor other than Owner or Operator?

☐ YES

☒ NO

If yes, give name and address:

GEOLOGICAL SURVEY

Representatives of Owner, Operator, Company, or Contractor who witnessed plugging

Marvin Woods

FEB 28 1984

CERTIFICATE

I, William E. Booker of Strickler Geological Services, Inc. (company)  
state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction,  
and that the facts stated herein are true, correct and complete to the best of my knowledge.

SIGNATURE

*William E. Booker*

ADDRESS

1425 S. Mission  
Mt. Pleasant, MI 48858

TITLE

Geologist

FINAL INSPECTIONS

DEPARTMENT REPRESENTATIVE

DATE

DEPARTMENT REPRESENTATIVE

DATE

OPERATORS USE

DEPARTMENT USE ONLY

Supplemental Plugging Data and Site Conditions:

MINERAL WELL COMPLETION REPORT  
TO BE FILED WITH THE SUPERVISOR WITHIN 60 DAYS  
AFTER COMPLETION OF WELL (ACT 315, P.A. 1969)

SUBMIT IN  
TRIPLICATE

FEB 24 1984

NAME OF OWNER OR OPERATOR  PPG Oil & Gas Co., Inc.		ADDRESS OF OWNER OR OPERATOR  2258 Enterprise Drive Mt. Pleasant, MI 48858	
NAME OF DRILLING CONTRACTOR  T. D. Provins Drilling Co.		ADDRESS OF DRILLING CONTRACTOR  2113 Enterprise Drive Mt. Pleasant, MI 48858	
WELL NAME Pilarski	WELL NUMBER 1-12	PERMIT NUMBER 1242-831-354	
LOCATION C NE NE	SECTION 12	TWP. 16N	RANGE 9W
TOWNSHIP Grant	COUNTY Mecosta		
FOOTAGE 844 Ft. from North Line and 666 Ft. from East Line of quarter section N or S E or W			
DATE DRILLING COMMENCED 10-22-83	DATE DRILLING COMPLETED 1-1-84	DATE WELL COMPLETED 1-3-84	TYPE OF WELL Test Hole
FORMATION COMPLETED IN -----	TOTAL DEPTH 8290, 8109, 8318, 7937	ELEVATION KB 1215.4	RB RT RF GN 1213.9 1199.0
ROTARY TOOLS From 0 Feet to 8318 Feet		CABLE TOOLS From Feet to Feet	

WELL CASING RECORD

TUBING AND CASING DATA				CEMENTING DATA			PERFORATIONS OR OPEN HOLE		
SIZE	LB./FT.	GRADE	DEPTH	SACKS	TYPE	STAGING DEPTH(S)	NO. HOLES	FROM	TO
24"	64#		45'	DP					
13 3/8"	54.5#		946'	900 sx	700 Lt-200 C1 A				
9 5/8"	40#		5480'	1585 sx	1265 Lt-350 C1 A 0-3650				
						3650-5980			

WATER ZONES

WIRE LINE LOGS RUN

FORMATION	FROM	TO	AMOUNT	SERVICE COMPANY	TYPE LOG	INTERVAL LOGGED	COPY TO SURVEY
(Fresh)				Schlumberger	LDT-CNL-GR	100-7937	Yes
-----					DLL-MLL	3450-5498	Yes
					Sonic	940-5490	

FRACTURE OR ACID TREATMENT

SOLUTION MINING

DATE	FROM	TO	QUANTITY	NAME AND NUMBER OF INJECTION AND TARGET WELL - DISTANCE APART
-----				-----

GEOLOGICAL SURVEY

FEB 28 1984

The information in and attached to this report is complete and correct.

MINERAL WELL SECTION

SIGNATURE <i>William E. Booker</i>	TITLE William E. Booker, Geologist	DATE 2/2/84
---------------------------------------	---------------------------------------	----------------

GIVE COMPLETE FORMATION RECORD ON REVERSE SIDE

GEOLOGICAL SURVEY FIELD REPORT  
Mt. Pleasant

File

11-29-83 - Skipper/Todd

Mineral Well - CONFIDENTIAL

Mecosta, Grant, Hersey  
1242-831-354 PPG Oil & Gas

Pularski 1-12

DRILLING

Provins Rig 7 RIH @ 8048. A-1 Ev. 7915 MD. Dev. Surveys

MD	Dev.	TVD	Obs. Dir.	Rect. Co-Ord.	
6112	15½	6108	N33W	49S	74W
6237	25½	6224	N33W		
6330	30½	6307	N30W		
6390	34-3/4	6357	N31W		
6497	37½	6444	N30W		
6672	36½	6584	N30W		
6884	34-3/4	6760	N31W		
6983	35	6837	N29W	352N	315W
7107	35-3/4	6938	N31W		
7263	36	7065	N29W		
7419	34-3/4	7192	N29W		
7576	34-3/4	7320	N29W		
7733	36-3/4	7447	N29W		
7889	37	7571	N29W	814N	565W
7960	37½	7628	N29W	852N	595W

Coring A-1 Ev., wouldn't disclose interval.

+ + + + +

GEOLOGICAL SURVEY

11-29-83

CONFIDENTIAL SECTION



GEOLOGICAL SURVEY FIELD REPORT  
Mt. Pleasant

File

CONFIDENTIAL

Mineral Well  
11-23-83 - Skipper

Mecosta, Grant, Hersey (Clinton)  
PPG Oil & Gas

Pilarski 1-12

DRILLING

Provins Rig 7 drlg. 7-7/8" @ 6190. KOP for directional redrill at 5852 in  
F Salt. Dir. Surveys:

MD	Dev.	TVD	Dir.	Rect. Co-ordinates	
5800	7/8	5799		76S	52W
5988	7½	5986		70S	63W
6112	15½	6108	N33W	49S	74W

+ + + + +

GEOLOGICAL SURVEY

OFC - 2 1983

1 1983

J. L. WILCOX & ASSOCIATES, INC.  
7230 North U.S. 131  
MANTON MICHIGAN 49663

(616) 824-6415

LETTER OF TRANSMITTAL

TO Geological Survey Division  
Dept. of Natural Resources  
P. O. Box 30028  
Lansing, MI 48909

DATE	Oct. 25, 1983	JOB NO.	83366
ATTENTION	Supervisor of Wells - Mineral Well		
RE:	WELL ELEVATIONS - PPG <del>888</del> 4348		
	Pilarski #1-12		
	Permit #1242-831-354		
	Section 12, T16N, R9W		
	Grant Twp., Mecosta Co., Michigan		

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via \_\_\_\_\_ the following items:

- ☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications  
☐ Copy of letter ☐ Change order ☒ Well Elevations

COPIES	DATE	NO.	DESCRIPTION
			GEOLOGICAL SURVEY
			NOV - 4 1983
			MINERAL WELL SECTION

THESE ARE TRANSMITTED as checked below:

- ☐ For approval ☐ Approved as submitted ☐ Resubmit \_\_\_\_\_ copies for approval  
☐ For your use ☐ Approved as noted ☐ Submit \_\_\_\_\_ copies for distribution  
☐ As requested ☐ Returned for corrections ☐ Return \_\_\_\_\_ corrected prints  
☐ For review and comment ☐ \_\_\_\_\_  
☐ FOR BIDS DUE \_\_\_\_\_ 19 \_\_\_\_\_ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS Elevations for subject well are as follows:

Ground = 1199.0

Platform = 1213.9

T KDB = 1215.4

NOTE: above elevations are U.S.G.S. datum.

COPY TO PPG Oil & Gas Co., Inc.

SIGNED: Fred Thompson

STATE OF MICHIGAN



NATURAL RESOURCES COMMISSION

THOMAS J. ANDERSON  
T. CAROLLO  
JOE A. HOEFER  
STEPHEN F. MONSMA  
HILARY F. SNELL  
PAUL H. WENDLER  
HARRY H. WHITELEY

JAMES J. BLANCHARD Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING  
BOX 30028  
LANSING MI 48909

RONALD O. SKOOG Director

October 10, 1983

*Sharon*  
*epc*

Mr. Donald P. Smith  
PPG Oil & Gas Co., Inc.  
2258 Enterprise Drive  
Mt. Pleasant, MI 48858

Dear Mr. Smith:

Enclosed is Mineral Well Permit #1242-831-354 to drill and abandon mineral exploration well in C, NE $\frac{1}{4}$ , NE $\frac{1}{4}$ , Sec. 12, T16N-R9W, Grant Twp., Mecosta County, Michigan. This permit was issued under the provisions of the "Mineral Well Act", Act 315 PA 1969, as amended.

Records of wells drilled under this permit are due within 60 days of completion. For information on contents of these records, please refer to Rule 72(a). These records and supporting information will be held confidential as per Section 17(5) and Rule 73 of the Act.

Whenever possible, please indicate County, Township & Range on each record sent into our office.

Thank you for your cooperation with us on these matters.

Sincerely,

A.J. Rarick, Acting Chief  
Mineral Well Unit  
Geological Survey Division

AJR:bb  
Enclosures

Nº 11355

**MINERAL WELL PERMIT**  
For a Test Well(s)

Permit No. 1242-831-354	
Date Issued 10-10-83	Date Expires 04-10-83

Permission is hereby granted to PPG Oil & Gas Co., Inc.  
2258 Enterprise Drive, Mt. Pleasant, MI 48858  
(name)  
(address)

to drill and abandon mineral exploration  
(type of operation) (type of test well(s))  
to be located in C, NE $\frac{1}{4}$ , NE $\frac{1}{4}$ , Sec. 12, T16N-R9W, Grant Twp., Mecosta County, Michigan

<u>Pilarski</u> (well name)	<u>1-12</u> (well number)	<u>Niagaran</u> (formation)	<u>8,000'</u> (intended depth)	<u>RB</u> <u>RF</u> <u>RT</u> <u>GN</u> (elevation)
--------------------------------	------------------------------	--------------------------------	-----------------------------------	-----------------------------------------------------------

**SPECIAL INSTRUCTIONS:**

HOLES TO BE PLUGGED WITH NEAT CEMENT FROM BOTTOM TO TOP.

Permit is subject to the provisions and requirements of Act 315 PA 1969, As Amended, and rules, requirements, or orders issued by the Supervisor of Mineral Wells and the Department of Natural Resources.

SUPERVISOR OF MINERAL WELLS

By: A.J. Larick  
Title: A.J. Larick, Acting Chief  
Address: Mineral Well Unit  
Geological Survey Division  
Dept. of Natural Resources  
Box 30028, Lansing, MI 48909

Please address all notifications, correspondence, and records to:

Telephone: 517/373-9289

— NOTICE —

1. This permit is issued on the basis of the approved program outlined in the application. No changes or alterations are to be made without the permission and approval of the Supervisor of Mineral Wells or his authorized representative.
2. This permit, or a copy thereof, shall be posted at a conspicuous place at the well location or be in the possession of the driller.
3. It is further made a requirement of this permit that the applicant (or contractor) give notice to the public utilities in accordance with Act 53, Public Acts of 1974, Compiled Laws 460.701 to 460.718 and comply with each of the requirements of the act.
4. An unusual, unexpected, or difficultly controllable large volume of oil, gas, brine or flowing fresh water or a condition hazardous to public health, safety, or waters of the state shall be reported immediately to the Supervisor.

Distribution: Linen-applicant—2-Lansing—3-field—4-applicant.

# GEOLOGICAL SURVEY

## State of Michigan Department of Natural Resources FIELD REVIEW OF PROPOSED WELL SITE

DOT - 6 1 4

### MINERAL WELL

1. Date of Inspection: 10-3-83
2. Name of Applicant: PPG Oil & Gas Co. Inc.
3. Well Name & Number: Pilarski 1-12
4. Legal Description: SE NE NE, Sec.12, T16N-QW, Grant Twp., Mecosta Co.
5. ☐ PR or ☐ DJ - Surface Owner: Daniel A. & Saundra A. Pilarski
6. Ownership Pattern: N/A
7. Land Use of the Area: Recreational
8. Cover Type/Density: Open Grass Field
9. Topography: Gently rolling
10. Soil Type & Drainage: Sand- Sandy-loam, Drainage- Good
11. Type, Direction & Distance to Surface Waters: None within 1/4 mi.
12. Well Site Dimensions: ( 3.7 Acres)
13. Access Road Length, Width, Location, Special Requirements: 600' of new trail will be constructed.  
( Acres)
14. Were soil erosion and sedimentation control measures adequately considered?  
☒ Yes ☐ No If not, specify additional requirements: \_\_\_\_\_
15. Wildlife concerns: Minimal
16. Fisheries concerns: Minimal
17. Timber Damage Appraisal (State Surface): N/A
18. Nearby Scenic, Historical or Recreational Areas: None
19. Is it reasonable to expect to encounter H<sub>2</sub>S during drilling? Yes  
Are proposed drilling practices adequate for H<sub>2</sub>S safety? ☒ Yes ☐ No If not, recommend additional requirements: \_\_\_\_\_
20. Is the Environmental Impact Assessment accurate and acceptable? ☒ Yes ☐ No If not, specify additional site construction requirements and/or restrictions. Comments if any: \_\_\_\_\_
  - a. Is an unlined earthen pit to receive fresh water muds prior to setting surface casing? ☒ Yes ☐ No If yes, explain: Pit utilized for fluids from the surface to setting point of the surface casing.
  - b. Is a 20 mil PVC liner to be used for pits receiving drilling fluids from below the surface pipe? ☒ Yes ☐ No If no, explain: \_\_\_\_\_

This document paid for with State funds

20. continued

c. How are salt cuttings to be handled? Cuttings will be dissolved, and brine circulated to the reserve pit.

d. Are all fluids in the lined pit to be removed and disposed of in approved method? ☒ Yes ☐ No If no, explain: \_\_\_\_\_

e. Are drilling muds and cuttings to be removed or totally encapsulated within the folded over liner and/or an additional impermeable cover as needed, for burial at four feet below grade or deeper? ☒ Yes ☐ No If no, explain: \_\_\_\_\_

f. Is approval of the encapsulation to be received from the District Geologist? ☒ Yes ☐ No If no, explain: \_\_\_\_\_

g. During well completion and test procedures, all fluids must be contained in steel tanks and transported to approved facilities for disposal. Comments: \_\_\_\_\_

Other Department personnel contacted? ☒ Yes ☐ No Comments: Ben Gunning

21. Site Restoration will be addressed upon well completion or site abandonment. At that time the District Geologist will develop specifications in keeping with the State Land Manager's or Surface Owner's objectives. \_\_\_\_\_

ON THE BASIS OF THE REVIEW FINDINGS:

I ☒ DO ☐ DO NOT RECOMMEND ISSUANCE OF A PERMIT TO DRILL THIS SITE.

DISTRICT GEOLOGIST'S COMMENTS: See Addendum to Field Review.

GEOLOGICAL SURVEY DIVISION:

BY: [Signature]

(signature)

10-3-83

(date)

LAND MANAGER'S COMMENTS: \_\_\_\_\_

LAND MANAGER (If State Surface): \_\_\_\_\_

(signature)

(date)

REGIONAL DIRECTOR'S COMMENTS: \_\_\_\_\_

REGIONAL DIRECTOR:

BY: \_\_\_\_\_

(signature)

(date)

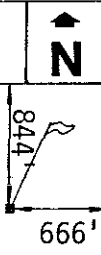
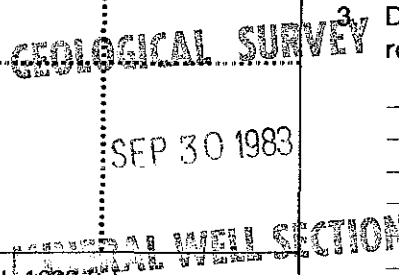
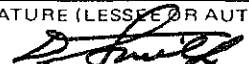
This document paid for with State funds.

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

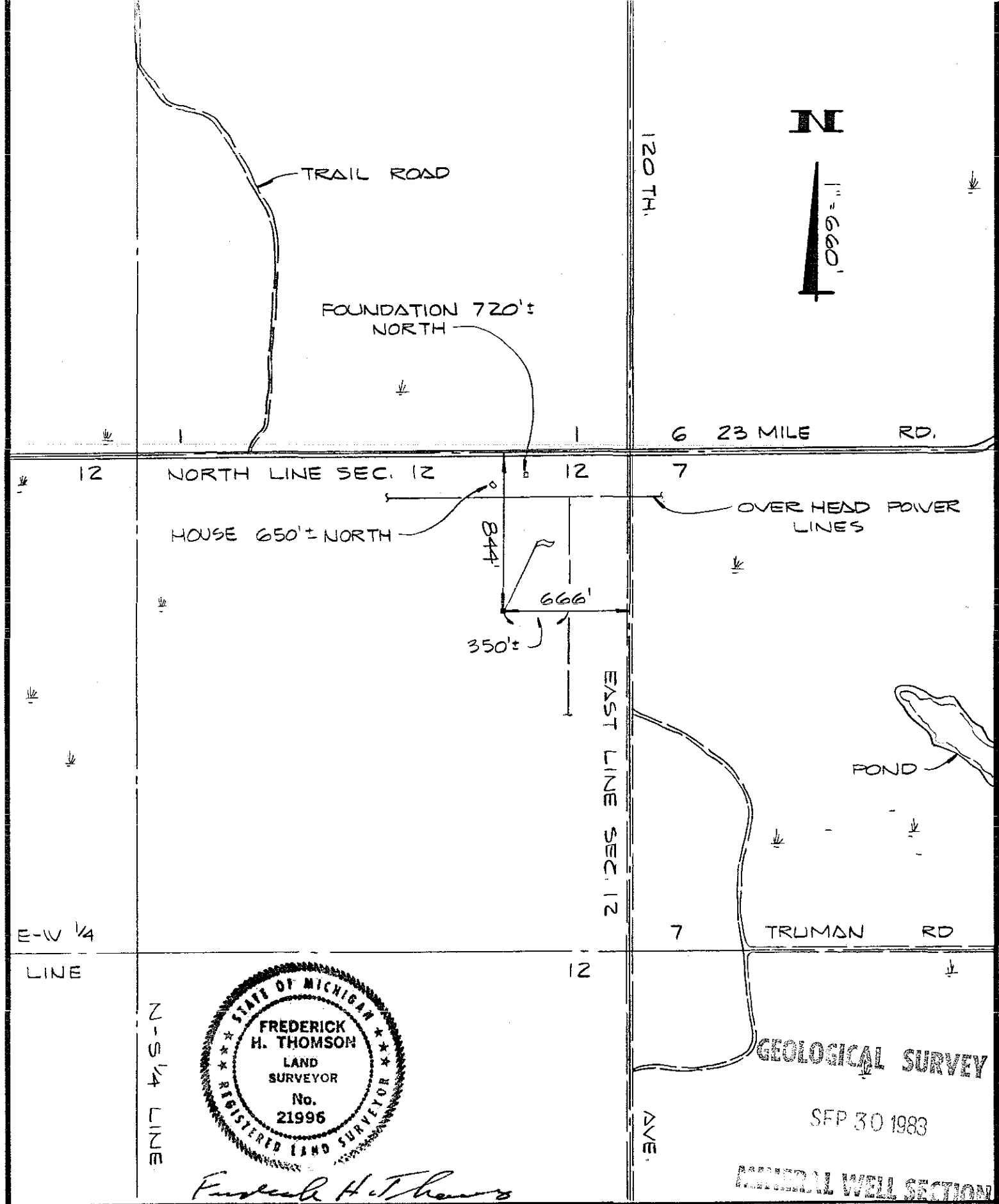
## SURVEY RECORD OF WELL LOCATION

(Submit five copies with Application for Permit to Drill a Well for Oil or Gas,  
Brine Disposal, Hydrocarbon Storage or Secondary Recovery)

83366

LESSEE (OWNER OF LEASE RIGHTS) PPG OIL & GAS COMPANY, INC.		WELL NO 1-12	
LESSOR (OWNER OF MINERAL RIGHTS) (Pilarski 1-12)			
LOCATION SE ¼ OF NE ¼ OF NE ¼ SECTION 12 T. 16 N R. 9 W			
TOWNSHIP Grant		COUNTY Mecosta	
PLAT BELOW REPRESENTS ONE FULL SECTION (1 Mile Square)			
SECTION 12			
(Scale of Plat — 1 inch equals 1320 ft.)		1. Outline drilling unit and spot well location on plat at left. Where drilling unit crosses section lines, divide the plat into an east half and a west half <b>OR</b> a north half and a south half (which ever applies). Outline the unit and locate the well in two directions from <b>NEAREST</b> quarter section and unit lines.	
		2. Location of well in two directions from <b>NEAREST</b> quarter section and unit lines is:  844 ft. from North line of Quarter Section (north-south) 666 ft. from East line of Quarter Section (east-west)  _____ ft. from _____ line of unit (north-south) _____ ft. from _____ line of unit (east-west)	
		3. Describe wellsite marker. Show or describe access route if it is not readily accessible.  Wellsite is marked with a painted wood stake. Site can be reached from North off of 23 Mile Road. See supplemental plat.  Ground Elevation = 1198.2 feet, U.S.G.S. datum.	
4. ON SEPARATE PLAT OR PLOT PLAN:  A. Locate, identify, and show distances to all roads, power lines, residences, farm buildings and other structures within 300 feet of the stake;  B. Locate, identify, and show distances to all lakes, streams, swamps, drainage ways or any other surface water features within 1320 feet of the stake.  5. In an ENVIRONMENTAL IMPACT ASSESSMENT describe all structures and surface features shown detailing plans for hazards prevention and erosion control (See instructions and guidelines for preparation of an environmental impact assessment).			
NAME OF INDIVIDUAL WHO SURVEYED WELL SITE Frederick H. Thomson		DATE 9-30-83	
ADDRESS J. L. WILCOX & ASSOCIATES, INC.		TITLE Surveyor	
7230 North U.S.-131		Manton, Michigan 49663	
I CERTIFY THE ABOVE INFORMATION IS COMPLETE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF			
SIGNATURE (LESSEE OR AUTHORIZED REPRESENTATIVE) 		DATE (MONTH. DAY. YEAR)	

BRUNING 44-122 48478



*Frederick H. Thomson*

SUPPLEMENTAL PLAT: PILARSKI  
# 1-12, SECTION 12 T1GN-R21V,  
GRANT TOWNSHIP, MECOSTA  
COUNTY, MICHIGAN

CLIENT: PPG OIL & GAS COMPANY, INC.

DATE  
2-29-83  
DRN  
R.M.  
CHD  
FHT  
SCALE  
V: 1"=660'  
H: 1"=660'

J.L. WILCOX & ASSOCIATES, INC.  
Engineers and Surveyors  
7230 N. U.S. - 131 • Manton, Michigan 49663  
NOTES  
F.B. 81  
PG. 73, 74  
SHEET  
1 OF 1  
JOB NO.  
83366



PPG Oil & Gas Co., Inc.

A Subsidiary of PPG Industries Inc

2258 Enterprise Drive Mt. Pleasant, Michigan 48858 (517) 773-3949



September 30, 1983

Mr. Al Rarick  
Department of Natural Resources  
Geological Survey Division  
P. O. Box 30028  
Lansing, MI 48909

Dear Mr. Rarick:

Re: PPG Oil & Gas Co., Inc. Standard Casing and Cementing  
Procedures

Listed below are PPG Oil & Gas Co., Inc. standard casing and cementing procedures:

1. Drive 24 pipe as deep as possible. This allows us to set 20" conductor inside and lower if trouble occurs with washout under conductor pipe while drilling surface hole.
2. Drill 17 1/2" hole to base of drift or to a firm footing as determined by geologist from samples.
3. Run 13 3/8" S.T.C. 48# Seamless H-40 casing equipped with Texas pattern weld on shoe. A float collar is set 30', or one joint, off bottom. The lower 5 joints of casing are strapped across collar in either two or three sectors. Top and bottom cement plugs with no centralizer as recommended by cementing company (see attached).
4. We also run a cement basket approximately 50' below surface, making sure cement is circulated back to surface.
5. We then drill 12 1/4" hole into Bass Islands formation or the Amherstburg if local drilling shows no lost circulation zones in the Bois Blanc and set 9 5/8" L.T.C. 40# N-80 grade pipe with a guide shoe on bottom with float collar first joint up and all bottom 6 joints secured with Weld-A or Baker Lok or some similar material.
6. Centralizers are run per cementer's recommendation attached.
7. For both the surface and intermediate casings, the lower joints of casing are roughened unless they appear rusty as this provides a much better bond for cement.

Sincerely,

A handwritten signature in dark ink, appearing to read 'D. Smith'.

Donald P. Smith  
Exploration Engineer

GEOLOGICAL SURVEY

SEP 30 1983

DPS/blb  
Attachment

Exhibit #1

NATURAL WELL SECTION

Surface Casing (13 3/8" in 17 1/2" hole @ 750')

- A. Use insert float and Texas Pattern Shoe and lock to shoe joint with thread lock.
- B. No centralizers
- C. Circulate hole a minimum of one complete circulation
- D. Do not reciprocate casing
- E. Run bottom (red) wiper plug. Do not use if carrying LCM in cement.
- F. Pump 70 bbls. fresh water ahead of cement
- G. Cement with:
  - 1. 475 sx 50/50 Poz., 6% total gel, 3%  $\text{CaCl}_2$   
1.54ft<sup>3</sup>/sk, 13.3#/gal, 7.66 gals/sk
  - 2. 200 sx Class "A", 3%  $\text{CaCl}_2$   
1.18 ft<sup>3</sup>/sk, 15.6#/gal, 7.66 gals/sk

Intermediate Casing (9 5/8" in 12 1/4" hole @ 5100')

Recommended Procedure:

- A. Use float collar and guide shoe and lock to shoe joint with Halliburton Weld-A
- B. Run one centralizer 10' above guide shoe and four more at every other collar spacing.
- C. Circulate hole a minimum of one complete circulation and until the drag stabilizes.
- D. Reciprocate casing while circulating and cementing. Stop reciprocation just prior to bumping top plug.
- E. Run bottom (red) wiper plug. Do not use if carrying LCM in cement.
- F. Pump 30 bbls. fresh water ahead of cement.
- G. Cement with enough cement from caliper log to bring cement to surface on all intermediate casing strings.
- H. Run top (black) wiper plug.
- I. Displace with fresh water.

Casing Equipment: (9 5/8")

Regular guide shoe, float collar with auto fill, Halliburton weld-A (2), Centralizers (5)

PPG Oil & Gas Co., Inc.

A Subsidiary of PPG Industries, Inc

2258 Enterprise Drive Mt. Pleasant, Michigan 48858 (517) 773-3949



September 30, 1983

Mr. Al Rarick  
Department of Natural Resources  
Geological Survey Division  
4th Floor, Mason Building  
P. O. Box 30028  
Lansing, MI 48909

Dear Mr. Rarick:

Subject: PPG Oil & Gas Co., Inc. Testing Program

The test well covered by this application is being drilled into the top of the Niagaran formation to approximately 8,000'. The primary objective is evaluation of the potash mineralization of the A-1 Evaporite, which occurred in the interval -7,579' to -7,931' in the Freudenburg 1-31 well located in the SE/4 NE/4 NE/4 of Section 31, T17N, R8W, Osceola County, Michigan.

The testing program will consist of cutting 4" cores through the anticipated potash mineralized section. Then gamma ray, neutron and other geophysical logs will be run at total depth.

Geophysical logs will also be run from the base of the surface casing to total depth. Sample cuttings will be retained and sample descriptions will be submitted with the plugging record. Potential disposal horizons will be drill stem tested.

Sincerely,

A handwritten signature in cursive script that reads 'Donald D. Metzger'.

Donald D. Metzger  
Director, Exploration  
& Michigan Operations

DDM/blb

**GEOLOGICAL SURVEY**

SEP 30 1983

Exhibit #2

**GENERAL WELL SECTION**



PPG Industries, Inc. 2250 Enterprise Drive Mt. Pleasant, Michigan 48858 (517) 773-3949

September 30, 1983

Mr. Al Rarick  
Department of Natural Resources  
Geological Survey Division  
4th Floor, Mason Building  
P.O. Box 30028  
Lansing, MI 48909

Re: Casing Removal and Plugging

Dear Mr. Rarick:

Upon completion of the coring and logging of the test well covered by attached permit application the well may be abandoned and plugged. If not abandoned, change of status will be requested at a later date.

Plugging will consist of running open end drill pipe to T.D. and setting continuous cement plugs to surface. The casing will be cut off at least 3 feet below surface and a 1/2" steel plate welded over the top of surface casing stub.

The cellar will be removed and backfilled according to D.N.R. specifications.

Sincerely,

A handwritten signature in black ink, appearing to read 'D. Smith'.

Donald P. Smith  
Exploration Engineer

DPS/blb

Exhibit #3

GEOLOGICAL SURVEY

SEP 30 1983

MINERAL WELL SECTION



PPG Industries, Inc 2250 Enterprise Drive Mt. Pleasant, Michigan 48858 (517) 773-3949

September 30, 1983

Mr. Al Rarick  
Department of Natural Resources  
Geological Survey Division  
4th Floor, Mason Building  
P.O. Box 30028  
Lansing, MI 48909

Re: Casing Removal and Plugging

Dear Mr. Rarick:

Upon completion of the coring and logging of the test well covered by attached permit application the well may be abandoned and plugged. If not abandoned, change of status will be requested at a later date.

Plugging will consist of running open end drill pipe to T.D. and setting continuous cement plugs to surface. The casing will be cut off at least 3 feet below surface and a 1/2" steel plate welded over the top of surface casing stub.

The cellar will be removed and backfilled according to D.N.R. specifications.

Sincerely,

A handwritten signature in dark ink, appearing to read 'D. Smith', written in a cursive style.

Donald P. Smith  
Exploration Engineer

DPS/blb

Exhibit #3

GEOLOGICAL SURVEY

SEP 30 1983

MINERAL WELL SECTION

**c. Johnson 1-6, Permit #36067**

PPG Industries, Inc. 1385-821-354, Johnson 1-6  
NE NW SW 56, T16N, R8W, CHIPPEWA T, MECOSTA Co.  
M4994

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

MINERAL WELL PLUGGING RECORD

File in DUPLICATE Within 30 Days After Plugging is Completed

AMENDED 2-1-88

PERMIT NUMBER

1385-821-354

DATE

12-21-82

OWNER OR OPERATOR

PPG Industries, Inc.

ADDRESS

One PPG Place, Pittsburgh, PA 15272

WELL NAME

Johnson

WELL NUMBER

1-6

WELL LOCATION

NE 1/4 NW 1/4 SW 1/4 SEC. 6 T. 16N R. 8W

TOWNSHIP

Chippewa

COUNTY

Mecosta

TYPE OF WELL (Brine, Disposal, Storage, or Test)

Dry Hole

TOTAL DEPTH

8390

FORMATION

Cincinnatian

DATE PLUGGING STARTED

10-29-82

DATE PLUGGING COMPLETED

11-1-82

WAS PERMISSION OF DEPT. OF NATURAL RESOURCES  
OBTAINED BEFORE PLUGGING BEGAN?

☒ YES

☐ NO

NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING

Michael Moss

CASING SIZE	WHERE SET	AMOUNT RECOVERED	SHOT OR RIPPED	TYPE OF BRIDGES OR PLUGS	DEPTH PLACED	NUMBER SACKS
24"	60	----	----	Cement	TD	457 POZ
13 3/8"	904	----	----	Cement Retainer	5550	
9 5/8"	5550	----	----	Cement	5550	Cl A

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

On 10-17-82, well was plugged back from 7852' to 6640' with 270 sacks Regular POZ 4% gel cement and 110 sacks Class A cement, and redrilled. On 10-29-82 ran in spotted 457 sx POZ, pulled up to 5500' and set cement retainer, came off and spotted 1175 sx of Class A.

(USE REVERSE SIDE IF NEEDED)

Were tools, tubing, casing, etc., lost or left  
in the hole before or during plugging?

☐ YES

☒ NO

If yes, give details:

GEOLOGICAL SURVEY

Did a Service Company pump mud,  
spot cement, or set bridge plugs?

☒ YES

☐ NO

If yes, give name and address:

Dowell

FEB 5 1983

Was the well plugged by a Company or  
contractor other than Owner or Operator?

☐ YES

☒ NO

If yes, give name and address:

Permits & Bonding Unit

Representatives of Owner, Operator, Company, or Contractor who witnessed plugging

Donald D. Metzger

CERTIFICATE

of Kalium Chemicals

(company).

I state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction  
and that the facts stated herein are true, correct and complete to the best of my knowledge.

SIGNATURE

ADDRESS

11126 140th Ave., Hersey, MI

TITLE

Resident Manager

FINAL INSPECTIONS

DEPARTMENT REPRESENTATIVE

DATE

DEPARTMENT REPRESENTATIVE

DATE



**MINERAL WELL COMPLETION REPORT**  
TO BE FILED WITH THE SUPERVISOR WITHIN 60 DAYS  
AFTER COMPLETION OF WELL (ACT 316, P.A. 1969)

SUBMIT IN  
TRIPLICATE

AMENDED 12-9-87

NAME OF OWNER OR OPERATOR PPG Industries, Inc.		ADDRESS OF OWNER OR OPERATOR 2258 Enterprise Drive Mt. Pleasant, MI 48858	
NAME OF DRILLING CONTRACTOR T. D. Provins Drilling Company		ADDRESS OF DRILLING CONTRACTOR 2113 Enterprise Drive Mt. Pleasant, MI 48858	
WELL NAME <u>Johnson</u>		WELL NUMBER <u>1-6</u>	PERMIT NUMBER <u>1382-82-3354</u>
LOCATION NE NW SW		SECTION 6	RANGE 8W
TOWNSHIP Chippewa		COUNTY Mecosta	
FOOTAGE 460 Ft. from <u>North</u> Line and <u>585</u> Ft. from <u>West</u> Line of quarter section			
DATE DRILLING COMMENCED 9-23-82	DATE DRILLING COMPLETED 10-29-82	DATE WELL COMPLETED ----	
FORMATION COMPLETED IN Cincinnatian	TOTAL DEPTH 8390	ELEVATION 1191.5	TYPE OF WELL Dry Hole
ROTARY TOOLS From 0 Feet to 8390 Feet		CABLE TOOLS From Feet to Feet	

**WELL CASING RECORD**

TUBING AND CASING DATA				CEMENTING DATA			PERFORATIONS OR OPEN HOLE		
SIZE	LB./FT.	GRADE	DEPTH	SACKS	TYPE	STAGING DEPTH(S)	NO. HOLES	FROM	TO
24"			60	0		60	NONE		
13 3/8"			904	950		904			
9 5/8"			5550	250		5550			

**WATER ZONES**

**WIRE LINE LOGS RUN**

FORMATION	FROM	TO	AMOUNT	SERVICE COMPANY	TYPE LOG	INTERVAL LOGGED	COPY TO SURVEY
(Fresh)				Schlumberger	LDT-CNL-GR	200-8390	
NONE					Sonic	200-8390	
					DLL-MLL	3300-8390	

**FRACTURE OR ACID TREATMENT**

**SOLUTION MINING**

DATE	FROM	TO	QUANTITY	NAME AND NUMBER OF INJECTION AND TARGET WELL - DISTANCE APART
NONE				NONE

The information in and attached to this report is complete and correct.

SIGNATURE <i>Donald D. Metzger</i> Donald D. Metzger	TITLE Kalium Chemicals Resident Manager	DATE 12-9-87
------------------------------------------------------------	-----------------------------------------------	-----------------

GIVE COMPLETE FORMATION RECORD ON REVERSE SIDE

# Strickler Geological Services, Inc.

1425 SOUTH MISSION ROAD • MT. PLEASANT, MICHIGAN 48858 • (517) 772-2107

December 21, 1982

Department of Natural Resources  
Geological Survey Division  
P. O. Box 30028  
Lansing, MI 48909

Dear Sirs:

Please find enclosed two (2) copies of the Mineral Well Plugging Record and two (2) copies of the Well Plugging Record which have been corrected, on the Johnson #1-6 located in the NE $\frac{1}{4}$  NW $\frac{1}{4}$  SW $\frac{1}{4}$  of Section 6, Chippewa Township, Mecosta County.

If you have any questions, please feel free to contact me.

Sincerely,

*William E Booker*

William E. Booker

/ljb  
Enclosures

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

MINERAL WELL PLUGGING RECORD

File in DUPLICATE Within 30 Days After Plugging is Completed

PERMIT NUMBER

~~36867~~ (1385-821-354)

DATE

12-21-82

OWNER OR OPERATOR

Willmet, Inc.

ADDRESS

2250 Enterprise Drive, Mt. Pleasant, MI 48858

WELL NAME

Johnson

WELL NUMBER

1-6

WELL LOCATION

NE 1/4 NW 1/4 SW 1/4 SEC. 6 T. 16N R. 8W

TOWNSHIP  
Chippewa

COUNTY  
Mecosta

TYPE OF WELL (Brine, Disposal, Storage, or Test)

Dry Hole

TOTAL DEPTH  
8390

FORMATION  
Cincinnatian

DATE PLUGGING STARTED  
10-29-82

DATE PLUGGING COMPLETED  
11-1-82

WAS PERMISSION OF DEPT. OF NATURAL RESOURCES  
OBTAINED BEFORE PLUGGING BEGAN?

☒ YES ☐ NO

NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING

Michael Moss

CASING SIZE	WHERE SET	AMOUNT RECOVERED	SHOT OR RIPPED	TYPE OF BRIDGES OR PLUGS	DEPTH PLACED	NUMBER SACKS
24"	60	---	---	Cement	TD	457 POZ
13 3/8"	904	---	---	Cement Retainer	5550	
9 5/8"	5550	---	---	Cement	5550	1175
						Cl A

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

Ran in spotted 457 sx POZ, pulled up to 5500' and set cement retainer,  
came off and spotted 1175 sx of Class A.

(USE REVERSE SIDE IF NEEDED)

Were tools, tubing, casing, etc., lost or left  
in the hole before or during plugging?

☐ YES ☒ NO

If yes, give details:

Did a Service Company pump mud,  
spot cement, or set bridge plugs?

☒ YES ☐ NO

If yes, give name and address:  
Dowell

Was the well plugged by a Company or  
Contractor other than Owner or Operator?

☐ YES ☒ NO

If yes, give name and address:

Representatives of Owner, Operator, Company, or Contractor who witnessed plugging

Marvin Woods

CERTIFICATE

I, William E. Booker of Stricker Geological Services, Inc. (company),  
state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction,  
and that the facts stated herein are true, correct and complete to the best of my knowledge.

SIGNATURE <u>William E. Booker</u>	ADDRESS 1425 S. Mission, Mt. Pleasant, MI	TITLE Geologist
---------------------------------------	----------------------------------------------	--------------------

FINAL INSPECTIONS

DEPARTMENT REPRESENTATIVE	DATE
DEPARTMENT REPRESENTATIVE	DATE

**OPERATORS USE**

**DEPARTMENT USE ONLY**

Supplemental Plugging Data and Site Conditions:

# Strickler Geological Services, Inc.

1425 SOUTH MISSION ROAD • MT. PLEASANT, MICHIGAN 48858 • (517) 772-2107

December 9, 1982

Mr. Bob Ives  
Mineral Wells  
Department of Natural Resources  
Geological Survey Division  
P. O. Box 30028  
Lansing, MI 48909

RE: WILLMET, INC.  
Johnson #1-6  
NE NW SW, Section 6, T16N R8W  
Chippewa Township, Mecosta County

Dear Mr. Ives:

Enclosed please find the following on the above referenced dry hole.

1. Mineral Well Plugging Record - 2 copies.
2. Mineral Well Completion Report - 2 copies.
3. Sample Description - 2 copies.

If you have any questions, please feel free to contact me.

Sincerely,

*William E. Booker*

William E. Booker *W*

/ljb  
Enclosures

GEOLOGICAL SURVEY

DEC 10 1982

MINERAL WELLS SECTION

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION  
**MINERAL WELL PLUGGING RECORD**  
File in DUPLICATE Within 30 Days After Plugging is Completed

PERMIT NUMBER

~~36062~~ (1385-821-354)

DATE

12-9-82

OWNER OR OPERATOR

Willmet, Inc.

ADDRESS

2250 Enterprise Drive, Mt. Pleasant, MI 48858

WELL NAME

Johnson

WELL NUMBER

1-6

WELL LOCATION

NE ¼ NW ¼ SW ¼ SEC. 6 T. 16N R. 8W

TOWNSHIP

Chippewa

COUNTY

Mecosta

TYPE OF WELL (Brine, Disposal, Storage, or Test)

Dry Hole

TOTAL DEPTH

8390

FORMATION

Cincinnatian

DATE PLUGGING STARTED

10-29-82

DATE PLUGGING COMPLETED

11-1-82

WAS PERMISSION OF DEPT. OF NATURAL RESOURCES  
OBTAINED BEFORE PLUGGING BEGAN?

☒ YES

☐ NO

NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING

Michael Moss

CASING SIZE	WHERE SET	AMOUNT RECOVERED	SHOT OR RIPPED	TYPE OF BRIDGES OR PLUGS	DEPTH PLACED	NUMBER SACKS
24"	60'	---	---	Cement	TD	457 POZ
13 3/8"	904	---	---	Cement Retainer	5550	
9 5/8"	5550	1500	Shot	Cement	5550	1597 Cl A

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

Cut and pulled casing - 1500', ran in spotted 457 sx POZ, pulled up to 5500' and set cement retainer, came off and spotted 1597 sx of Class A.

DEC 12 1982

(USE REVERSE SIDE IF NEEDED)

Were tools, tubing, casing, etc., lost or left  
in the hole before or during plugging?

☐ YES

☒ NO

If yes, give details:

Did a Service Company pump mud,  
spot cement, or set bridge plugs?

☒ YES

☐ NO

If yes, give name and address:

Dowell

Was the well plugged by a Company or  
Contractor other than Owner or Operator?

☐ YES

☒ NO

If yes, give name and address:

Representatives of Owner, Operator, Company, or Contractor who witnessed plugging

Marvin Woods

**CERTIFICATE**

I, William E. Booker of Strickler Geological Services, Inc. (company),  
state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction,  
and that the facts stated herein are true, correct and complete to the best of my knowledge.

SIGNATURE

*William Booker*

ADDRESS

1425 S. Mission, Mt. Pleasant MI

TITLE

Geologist

**FINAL INSPECTIONS**

DEPARTMENT REPRESENTATIVE

DATE

DEPARTMENT REPRESENTATIVE

DATE

## This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or printed text on the paper. A small dark mark is visible near the top right corner.

Supplemental Plugging Data and Site Conditions:

MINERAL WELL COMPLETION REPORT  
TO BE FILED WITH THE SUPERVISOR WITHIN 60 DAYS  
AFTER COMPLETION OF WELL (ACT 315, P.A. 1969)

SUBMIT IN  
TRIPLICATE

PN 1385-821-35

NAME OF OWNER OR OPERATOR Willmet, Inc.		ADDRESS OF OWNER OR OPERATOR 2250 Enterprise Drive Mt. Pleasant, MI 48858	
NAME OF DRILLING CONTRACTOR T. D. Provins Drilling Company		ADDRESS OF DRILLING CONTRACTOR 2113 Enterprise Drive Mt. Pleasant, MI 48858	
WELL NAME Johnson		WELL NUMBER 1-6	PERMIT NUMBER 36067
LOCATION NE NW SW		SECTION 6	TWP. 16N RANGE 8W
TOWNSHIP Chippewa		COUNTY Mecosta	
FOOTAGE 460 Ft. from North Line and 585 Ft. from West Line of quarter section N or S E or W			
DATE DRILLING COMMENCED 9-23-82	DATE DRILLING COMPLETED 10-29-82	DATE WELL COMPLETED ---	TYPE OF WELL Dry Hole
FORMATION COMPLETED IN Cincinnati	TOTAL DEPTH 8390	ELEVATION KB 1191.5	RB RT RF GN 1175
ROTARY TOOLS From 0 Feet to 8390 Feet		CABLE TOOLS From Feet to Feet	

WELL CASING RECORD

TUBING AND CASING DATA				CEMENTING DATA			PERFORATIONS OR OPEN HOLE		
SIZE	LB./FT.	GRADE	DEPTH	SACKS	TYPE	STAGING DEPTH(S)	NO. HOLES	FROM	TO
24"			60	0		60	NONE		
13 3/8"			904	950		904			
9 5/8"			5550	250	class 'A'	5550			

WATER ZONES

WIRE LINE LOGS RUN

FORMATION	FROM	TO	AMOUNT	SERVICE COMPANY	TYPE LOG	INTERVAL LOGGED	COPY TO SURVEY
(Fresh)				Schlumberger	LDT-CNL-GR	200-8390	
NONE					Sonic	200-8390	
					DLL-MLL	3300-8390	

FRACTURE OR ACID TREATMENT

SOLUTION MINING

DATE	FROM	TO	QUANTITY	NAME AND NUMBER OF INJECTION AND TARGET WELL - DISTANCE APART
NONE				NONE

The information in and attached to this report is complete and correct.

SIGNATURE William Booker	TITLE William E. Booker, Geologist	DATE 12/6/82
-----------------------------	---------------------------------------	-----------------



# FORMATION RECORD

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

EVALUATION USED: <input type="checkbox"/> KB <input type="checkbox"/> RT <input type="checkbox"/> RF <input type="checkbox"/> GR	GEOLOGIST NAME:	TOPS TAKEN FROM: <input type="checkbox"/> SAMPLE LOG <input type="checkbox"/> ELECTRIC LOG
-------------------------------------------------------------------------------------------------------------------------------------	-----------------	-----------------------------------------------------------------------------------------------

FROM	TO	FORMATION (TYPE, COLOR, ETC.)	FROM	TO	FORMATION (TYPE, COLOR, ETC.)

IF WELL WAS CORED, ATTACH CORE DESCRIPTION AND ANALYSIS

LIST ATTACHMENTS:

GEOLOGICAL SURVEY USE ONLY
REVIEWED BY _____



WILLMET, INC.

2250 ENTERPRISE DRIVE • MOUNT PLEASANT, MICHIGAN 48858  
517 • 773 • 3949

October 29, 1982

Mr. Robert E. Ives, Supervisor  
Mineral Wells  
State of Michigan  
Department of Natural Resources  
Geological Survey Division  
P. O. Box 30028  
Lansing, MI 48909

Re: Sidetrack of the Johnson 1-6

Dear Mr. Ives:

As discussed with your personnel prior to taking the action, Willmet plugged back and sidetracked the Johnson 1-6 located in the NW/4 of SW/4, Section 6, T16N, R8W, Mecosta County, Michigan. This operation was made necessary due to a mechanical problem which occurred during a coring operation which resulted in loss of the core. A cement plug was set with the top of the cement being at 6,640 feet, and the well was sidetracked to the east approximately 40'.

We were informed prior to conducting this sidetracking operation that no permit was required. This letter is for your information and for file purposes.

Sincerely,

Donald D. Metzger  
Director, Exploration  
& Michigan Operations

DDM/jlc

cc: Al Rarick

GEOLOGICAL SURVEY

NOV 1 - 1982

MINERAL WELL SECTION

TO: Innarah Kothacamury

FROM: Wayne T. Todd

SUBJECT: T.O.C.

OUR JOB NO.

DATE OF MEMO

1-6-83

**MESSAGE**

Innarah here are the T.O.C. you requested on the following wells  
Johnson 1-6 — 4550', Park 1-12 — 4040', Stien 1-7 — 4630',  
Thompson 3-36 — 4000', Wark 1-30 — 4700', Paine 1-35 —  
Cement 5525' to 4400' then 3349' to surface, DV tool at 3349'

SENDER — DO NOT WRITE BELOW THIS LINE

SIGNED

*Wayne T. Todd*

**REPLY**

*FILED IN  
WILLOMEY  
JOHNSON 1-6*

SIGNED

DATE

ORIGINAL

SENDER — Retain part 2 for your follow-up, send parts 1 and 3 to addressee  
RECIPIENT — Retain part 1 and return part 3

No. 10049

**MINERAL WELL PERMIT**  
For a Test Well(s)

Permit No. 1385-821-354	
Date Issued 9/2/82	Date Expires 3/2/83

Permission is hereby granted to WILLMET, INC. (name)  
2250 Enterprise Dr., Mt. Pleasant, Michigan 48858 (address)  
to drill & abandon (type of operation) mineral exploration (type of test well(s))  
to be located in NE/4 NW/4 SW/4 Section 6, T16N-R8W, Chippewa Twp., Mecosta County  
Johnson 1-6 (well name) Niagaran (formation) 8,000 ± (intended depth) RB RF  
GN (elevation)

**SPECIAL INSTRUCTIONS:**

24 HOUR NOTIFICATION PRIOR TO STARTING DATE, CASING, CEMENTING AND PRESSURE TESTS  
AND LOGGING ACTIVITIES IS REQUIRED.

Permit is subject to the provisions and requirements of Act 315 PA 1969, As Amended, and rules, requirements, or orders issued by the Supervisor of Mineral Wells and the Department of Natural Resources.

SUPERVISOR OF MINERAL WELLS

By: Innaiah Pothacamury  
Title: Supervisor of Test Wells  
Address: Mineral Well Unit  
Geological Survey Division  
DNR  
Box 30028  
Lansing, MI 48909  
Telephone: (517) 373-9289

Please address all notifications, correspondence, and records to:

— NOTICE —

1. This permit is issued on the basis of the approved program outlined in the application. No changes or alterations are to be made without the permission and approval of the Supervisor of Mineral Wells or his authorized representative.
2. This permit, or a copy thereof, shall be posted at a conspicuous place at the well location or be in the possession of the driller.
3. It is further made a requirement of this permit that the applicant (or contractor) give notice to the public utilities in accordance with Act 53, Public Acts of 1974, Compiled Laws 460.701 to 460.718 and comply with each of the requirements of the act.
4. An unusual, unexpected, or difficultly controllable large volume of oil, gas, brine or flowing fresh water or a condition hazardous to public health, safety, or waters of the state shall be reported immediately to the Supervisor.

Distribution: Linen-applicant—2-Lansing—3-field—4-applicant.



WILLMET, INC.

2250 ENTERPRISE DRIVE • MOUNT PLEASANT, MICHIGAN 48858  
517 • 773 • 3949

August 30, 1982

State of Michigan  
Department of Natural Resources  
P. O. Box 30028  
Lansing, Michigan 48909

Attention: Mr. Bob Ives

Re: Request for Test Well Permit  
under Mineral Well Act,  
NE/4 NW/4 SW/4 of Sec. 6,  
T16N, R8W, Mecosta County,  
Michigan

Dear Mr. Ives:

An application for a Mineral Test Well for the Johnson 1-6, at the referenced location, was submitted on August 13, 1982. This application provided for directional drilling so that the bottom-hole location would be 95' east of the surface location. In view of the current interpretation that directional drilling is prohibited under the Mineral Well Act, please consider this letter as a revision to that application, with a revised bottom-hole location corresponding to the surface location.

Your cooperation is appreciated.

Sincerely,

Donald P. Smith  
Exploration Engineer

DPS/jlc

cc: Ty Black  
Wayne Todd  
Sam Alguire

GEOLOGICAL SURVEY

SEP 1 1982

MINERAL WELL SECTION

State of Michigan  
Department of Natural Resources  
Geological Survey Division

FIELD REVIEW OF PROPOSED WELL SITE

(RETURN to Geological Survey)

Date of Inspection: 8-17-82

1. Name of Applicant: Willmet, Inc.
2. Well Name & Number: Johnson 1-6
3. Legal Description: NE NW SW Sec 6 T16N-R8W Chippewa Township Mecosta County
4. Surface Owner: Donald W. and E. Caroline Johnson  
(If other than mineral owner)
5. Topography: Gently Sloping
6. Cover Type/Density: Mostly open with scattered Pine, Cherry, Maple and Elm.
7. Land Utilization: Agricultural and Recreational uses
8. Is there any type of surface water nearer than one-quarter (1/4) mile? No  
(Specify direction and distance)
9. Is the Environmental Impact Assessment accurate and acceptable? Yes
10. Have necessary soil erosion and sedimentation control measures been adequately considered? Yes
11. Are there any special drill site construction requirements and restrictions? No  
(Specify)

Inspected by:

W. J. Toal  
(signature)

8-19-82

(date)

By the signature below of the agent of applicant, the applicant agrees to implement specifications stated in Item #11 above.

(signature)

(date)

(title)

(date)

GEOLOGICAL SURVEY

SEP 1 1982

R 7518 - 1

4/75



WILLMET INCORPORATED

2250 ENTERPRISE DRIVE • MOUNT PLEASANT, MICHIGAN 48858  
517 • 773 • 3949

August 13, 1982

State of Michigan  
Department of Natural Resources  
P. O. Box 30028  
Lansing, Michigan 48909

Attn.: Mr. Robert Ives

Re: Request for Test Well Permit under  
Mineral Well Act, NE/4 NW/4 of SW/4,  
Section 6, T16N-R8W, Mecosta County, MI

Dear Mr. Ives:

Enclosed herewith please find our check in the amount of \$1.00 for the fee for a Mineral Test Well Application for the above noted location. This Mineral Test Well Application is submitted as a replacement for the Test Well Permit, No. 10036, for the Johnson 1-6 located in the SE/4 SE/4 NW/4, Section 6, T16N-R8W, Mecosta County, Michigan. Please cancel this latter permit, as it is now inappropriate to drill at that location in view of this newly proposed location.

We will arrange to have J. L. Wilcox & Associates do an elevation survey within ten (10) days after spud date of the above well.

Please note that an application for an Oil & Gas Drilling Permit for this location is being submitted simultaneously with this application. It is our understanding that this drilling activity will be conducted jointly under Acts 315 and 61 as per the letter from R. Thomas Segall, Assistant Supervisor of Wells, to Mr. Donald D. Metzger, dated August 4, 1982.

While sour oil and gas zones are not expected, good drilling practices and proper fluid density will be employed and should readily control such occurrences. Procedures regarding the use of hydrogen sulfide signs, flags and wind indicators will be employed. Fresh air breathing apparatus will be available at the well site. Part 2 of the Oil & Gas Sour Gas Contingency Plan, although not required for this well, is attached for reference purposes.

It is requested that all information be kept confidential as the regulations allow.

Sincerely,

Donald D. Metzger  
Director, Exploration and  
Michigan Operations

DDM:pka

GEOLOGICAL SURVEY

AUG 16 1982

MINERAL WELL SECTION

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

APPLICATION FOR A MINERAL WELL PERMIT

To Drill, Operate, Convert, or Rework  
a Brine, Storage, Disposal, or Test Well.

By Authority of Act 315, P. A. 1969

1. DATE OF APPLICATION August 13, 1982	2. FEE ENCLOSED \$1.00
3. APPLICATION TO Drill	
4. TYPE MINERAL WELL D-5 (Test Well)	5. WELL DESIGNATION Johnson 1-6
6. LOCATION: NE/4 of the NW/4 of the SW 1/4 SEC. 6 T 16N R 8W	
7. TOWNSHIP Chippewa	8. COUNTY Mecosta

9. APPLICANT Willmet, Inc.		10. TELEPHONE (517)773-3949	
11. ADDRESS (Street, City, State) 2250 Enterprise Drive, Mt. Pleasant, MI 48858		12. ZIP CODE 48858	
13. SURETY OR SECURITY COMPANY Hartford Accident & Indemnity Co.	14. TYPE <input type="checkbox"/> SINGLE <input checked="" type="checkbox"/> BLANKET	15. AMOUNT \$5,000	16. BOND NO. 4486243
17. OWNER OR SURFACE RIGHTS Donald W. & E. Caroline Johnson		18. OWNER OR MINERAL RIGHTS Donald W. Johnson, et ux.; Carrie M. Pangborn	
19. DRILLING CONTRACTOR T. D. Provins Drilling	20. ADDRESS P. O. Box 642, Mt. Pleasant, MI 48858		21. TELEPHONE (517)773-6946
22. TYPE DRILLING TOOLS <input type="checkbox"/> CABLE <input checked="" type="checkbox"/> ROTARY <input type="checkbox"/> COMBINATION	23. FORMATION Niagaran		24. INTENDED DEPTH 8,000'
25. PROJECT ENGINEER OR GEOLOGIST W. J. Strickler (to A-1 Carbonate) D. Metzger, C. Jones (from A-1 to TD)		26. ADDRESS 2250 Enterprise Dr., Mt. Pleasant, MI 48858	
		27. TELEPHONE (517)773-3949	

28. PROGRAM OF DRILLING, CONVERTING, REWORKING, CASING, CEMENTING, COMPLETING, OPERATING, AND MONITORING.  
(See appropriate instruction sheet. Attach 3 copies of proposed program — including but not necessarily limited to information requested in the instruction sheet.)

CASING PROGRAM:  
Size Depth Cement

INSTRUCTION SHEET NO.		
Type of Well	Drill-New	Rework*
Brine	D-1	R-1
Storage	D-2	R-1
Disposal	D-3	R-1
Solution Mining	D-4	R-2
Test Well	D-5	R-1

\*Rework, Deepen, or Convert to New Use.

Exhibit 1, 2, 3 enclosed

GEOLOGICAL SURVEY

AUG 23 1982

MINERAL WELL SECTION

THERE WILL BE NO CHANGES IN THE PROGRAM OUTLINED IN THIS APPLICATION WITHOUT APPROVAL OF THE SUPERVISOR OF MINERAL WELLS OR HIS AUTHORIZED REPRESENTATIVE.

29. ADDRESS CORRESPONDENCE AND PERMIT TO: Willmet, Inc., 2250 Enterprise Dr., Mt. Pleasant, MI 48858	30. TELEPHONE (517)773-3949
---------------------------------------------------------------------------------------------------------	--------------------------------

MINERAL WELL SECTION USE ONLY		The Applicant agrees to comply with provisions and requirements of Act 315, P.A. 1969, and asserts that the information on this application and attached report is true and correct.	
STATUS OF BOND		SIGNATURE (APPLICANT/AUTHORIZED REP.) <i>D. Smith</i>	
APPLICATION APPROVED BY <i>IP</i>		DATE <i>Aug 13/82</i>	
PERMIT NUMBER <i>1385-821-354</i>		NAME (TYPED) Donald P. Smith	
DATE ISSUED <i>9/2/82</i>		TITLE Exploration Engineer	
ISSUED BY <i>IP</i>		FOR CASHIER'S USE ONLY	
DISTRIBUTION: White — Lansing Canary — Field Pink — Applicant		R 7500 2/73	



STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

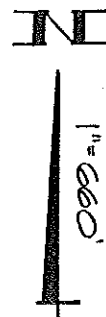
## SURVEY RECORD OF WELL LOCATION

(Submit five copies with Application for Permit to Drill a Well for Oil or Gas,  
Brine Disposal, Hydrocarbon Storage or Secondary Recovery)

82266

LESSEE (OWNER OF LEASE RIGHTS) <div style="text-align: center; font-weight: bold;">WILLMET, INC.</div>	
LESSOR (OWNER OF MINERAL RIGHTS) Donald Johnson (Johnson 1-6)	WELL NO. 1-6
LOCATION NE ¼ OF NW ¼ OF FR' L SW ¼ SECTION 6 T. 16N R. 8W	
TOWNSHIP Chippewa	COUNTY Mecosta
<div style="display: flex; justify-content: space-between; align-items: center;"> <div> <p>PLAT BELOW REPRESENTS ONE FULL SECTION (1 Mile Square)</p> </div> <div style="text-align: center;"> <p>↑ <b>N</b></p> </div> </div>	
	<ol style="list-style-type: none"> <li>Outline drilling unit and spot well location on plat at left. Where drilling unit crosses section lines, divide the plat into an east half and a west half <b>OR</b> a north half and a south half (which ever applies). Outline the unit and locate the well in two directions from <b>NEAREST</b> quarter section and unit lines.</li> <li>Location of well in two directions from <b>NEAREST</b> quarter section and unit lines is:  <div style="text-align: center;">SURFACE LOCATION</div> <div style="text-align: center;">460 ft. from North line of Quarter Section <small>(north-south)</small></div> <div style="text-align: center;">585 ft. from West line of Quarter Section <small>(east-west)</small></div> <div style="text-align: center;">_____ ft. from _____ line of unit <small>(north-south)</small></div> <div style="text-align: center;">_____ ft. from _____ line of unit <small>(east-west)</small></div> </li> <li>Describe wellsite marker. Show or describe access route if it is not readily accessible.  <u>Wellsite is marked with a painted wood stake. Site can be reached from the North off of county trail road, Evergreen Road. See supplemental plat.</u> </li> </ol>
(Scale of Plat - 1 inch equals 1320 ft.)	
<p>4. ON SEPARATE PLAT OR PLOT PLAN:</p> <p>A. Locate, identify, and show distances to all roads, power lines, residences, farm buildings, and other structures within 300 feet of the stake;</p> <p>B. Locate, identify, and show distances to all lakes, streams, swamps, drainage ways or any other surface water features within 1320 feet of the stake.</p> <p>5. In an ENVIRONMENTAL IMPACT ASSESSMENT describe all structures, and surface features shown detailing plans for hazards prevention and erosion control (See instructions and guidelines for preparation of an environmental impact assessment).</p>	
<div style="display: flex; justify-content: space-between;"> <div> <p>NAME OF INDIVIDUAL WHO SURVEYED WELL SITE <i>Frederick H. Thomson</i> Frederick H. Thomson, LS#21996</p> <p>ADDRESS J. L. WILCOX &amp; ASSOCIATES, INC. 7230 North U.S.-131 Manton, Michigan 49663</p> </div> <div style="text-align: center;"> <p>DATE 8-12-82</p> <p>TITLE Surveyor</p> </div> </div>	
<p>I CERTIFY THE ABOVE INFORMATION IS COMPLETE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF</p>	
SIGNATURE (LESSEE OR AUTHORIZED REPRESENTATIVE) <i>D. Smith</i>	ADDRESS (IF DIFFERENT THAN LESSEE) <div style="text-align: right;">DATE (MONTH, DAY, YEAR) <i>Aug 13/82</i></div>





N-S 1/4 LINE

120TH. AVE.

RD.

E-W 1/4 LINE

RED PINES

EVERGREEN

WET AREA

6

585

260'

175'±

175'± WEST  
TO EDGE OF  
PLANTED RED PINES

POWER LINE  
WIRES 30'± ABOVE GROUND

WEST LINE SEC. 6

GEOLOGICAL SURVEY

AUG 16 1982

CENTRAL WELL SECTION

23 MILE RD. 1

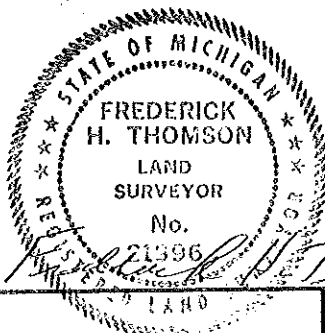
6 SOUTH LINE SEC. 6

12

7

7

POGY  
LAKE



SUPPLEMENTAL PLAT: JOHNSON  
#1-6, SECTION 6, T16N-R8W,  
CHIPPEWA COUNTY, MICHIGAN

CLIENT: WILLMET INC.

DATE  
8-12-82  
DRN. R.M.  
CHD. FHT  
SCALE  
V. H. 1"=660'

J.L. WILCOX & ASSOCIATES, INC.  
Engineers and Surveyors  
7230 N. U.S. - 131 • Manton, Michigan 49663

NOTES  
F.B. 173  
PG 43-44

SHEET  
1 OF 1

JOB NO.  
82266

WILLMET INC.  
JOHNSON 1-5  
MECOSTA COUNTY MICHIGAN

VERTICAL SECTION 1 IN. = 300 FT.

feet

6400

H.O.P.O. 6553' H.D.  
BUILD - 2.33' / 100'

6700

MAXIMUM ANGLE 0.29'  
AT 6763' H.D.  
6763' TVD. 15' DISP.

7000

START 1.23' / 100' DNEP  
AT 7077' H.D.  
7077' TVD. 57' DISP.

7300

VERTICAL AT 7333' H.D.  
7333' TVD.

7600

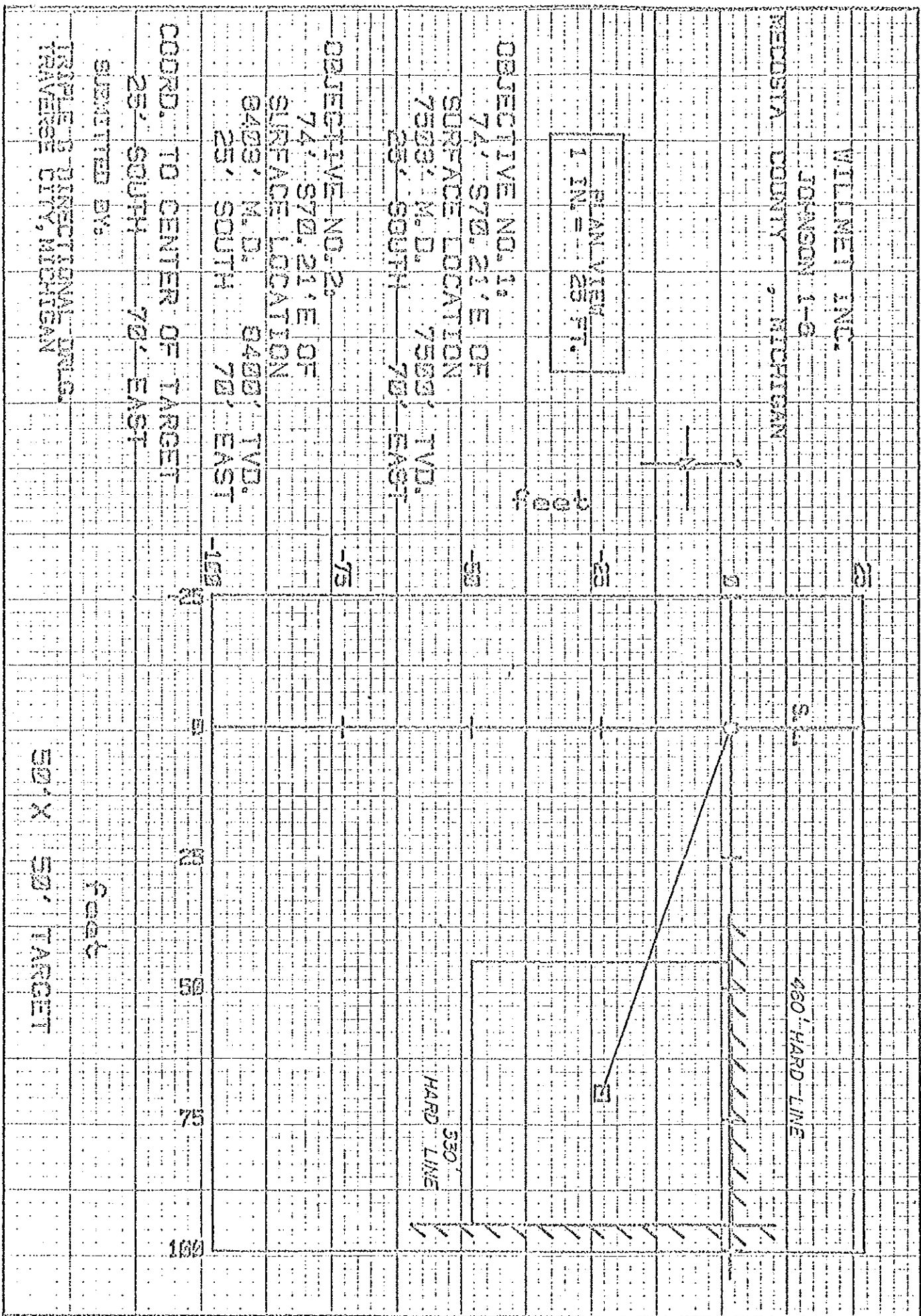
7900

8200

8400' H.D.  
8400' TVD.

8500

feet





WILLMET, INC.

2250 ENTERPRISE DRIVE • MOUNT PLEASANT, MICHIGAN 48858  
517 • 773 • 3949

August 13, 1982

Mr. Robert E. Ives  
Department of Natural Resources  
Geological Survey Division  
4th Floor, Mason Building  
P. O. Box 30028 Lansing, MI 48909

Dear Mr. Ives:

Subject: Willmet Standard Casing and Cementing Procedures

Listed below are Willmet's standard casing and cementing procedures:

1. Drive 24" conductor pipe as deep as possible. This allows us to set 20" conductor inside and lower if trouble occurs with washout under conductor pipe while drilling surface hole.
2. Drill 17 1/2" hole to base of drift or to a firm footing as determined by geologist from samples.
3. Run 13 3/8" S.T.C. 48# Seamless H-40 casing equipped with Texas pattern weld on shoe. A float collar is set 30', or one joint, off bottom. The lower 5 joints of casing are strapped across collar in either two or three sectors. Top and bottom cement plugs with no centralizer as recommended by cementing company (see attached).
4. We also run a cement basket approximately 50' below surface, making sure cement is circulated back to surface.
5. We then drill 12 1/4" hole 50' into Bass Islands formation or the Amherstburg if local drilling shows no lost circulation zones in the Bois Blanc and set 9 5/8" L.T.C. 40# N-80 grade pipe with a guide shoe on bottom with float collar first joint up and all bottom 6 joints secured with Weld-A or Baker Lok or some similar material.
6. Centralizers are run per cementer's recommendation attached.
7. For both the surface and intermediate casings, the lower joints of casing are roughened unless they appear rusty as this provides a much better bond for cement.

Sincerely,

Donald P. Smith  
Exploration Engineer

DPS/jlc

Attachment

Exhibit #1

GEOLOGICAL SURVEY

AUG 16 1982

MINERAL WELL SECTION

Surface Casing ( 13 3/8" in 17 1/2" hole @ 750 ft.

- A. Use insert float and Texas Pattern Shoe and lock to shoe joint with thread lock.
- B. No centralizers
- C. Circulate hole a minimum of one complete circulation
- D. Do not reciprocate casing
- E. Run bottom (red) wiper plug.  
Do not use if carry LCM in cement
- F. Pump 70 bbls fresh water ahead of cement
- G. Cement with:
  - 1. 475 sx 50/50 Poz, 6% total Gel, 3% CaCl<sub>2</sub>  
1.54ft<sup>3</sup>/sk, 13.3#/gal, 7.66 gals/sk
  - 2. 200 sx Class "A", 3% CaCl<sub>2</sub>  
1.18 ft<sup>3</sup>/sk, 15.6#/gal, 7.66 gals/sk

Intermediate Casing: ( 9 5/8 in 12 1/4" hole @ 5100 ft)

Recommended Procedure:

- A. Use float collar and guide shoe and lock to shoe joint with Halliburton Weld-A
- B. Run one centralizer 10' above guide shoe and four more at every other collar spacing.
- C. Circulate hole a minimum of one complete circulation and until the drag stabilizes.
- D. Reciprocate casing while circulating and cementing. Stop reciprocation just prior to bumping top plug.
- E. Run bottom (red) wiper plug.  
Do not use if carrying LCM in cement
- F. Pump 30 bbls fresh water ahead of cement.
- G. Cement with:
  - 1. 150 sx Special Cement

NOTE: State requires 500' of annulus fillup and a minimum of 150 sx for intermediate casing.

- H. Run top (black) wiper plug.
- I. Displace with fresh water.

Casing Equipment: (9 5/8)

Regular Guide Shoe  
Float Collar with Auto Fill  
Halliburton Weld-A (2)  
Centralizers (5)

GEOLOGICAL SURVEY

AUG 16 1962

RECEIVED BY FIELD STATION



WILLMET, INC.

2250 ENTERPRISE DRIVE • MOUNT PLEASANT, MICHIGAN 48858  
517 • 773 • 3949

August 13, 1982

Mr. Robert E. Ives  
Department of Natural Resources  
Geological Survey Division  
4th Floor, Mason Building  
P. O. Box 30028  
Lansing, MI 48909

Dear Mr. Ives:

Subject: Willmet Testing Program

The test well covered by this application is being drilled into the top of the Niagaran formation to approximately 8,000'. The primary objective is evaluation of the potash mineralization of the A-1 Evaporite, which occurred in the interval -7,579' to -7,931' in the Freudenburg 1-31 well located in the SE/4 NE/4 NE/4 of Section 31, T17N, R8W, Osceola County, Michigan.

The testing program will consist of cutting 4" cores through the anticipated potash mineralized section. Then gamma ray, neutron and other geophysical logs will be run at total depth.

Geophysical logs will also be run from the base of the surface casing to total depth. Sample cuttings will be retained and sample descriptions will be submitted with the plugging record. Hydrocarbon shows will be drill stem tested.

Sincerely,

*Donald D. Metzger/jc*

Donald D. Metzger  
Director, Exploration  
& Michigan Operations

DDM/jlc

Exhibit #2



WILLMET, INC.

2250 ENTERPRISE DRIVE • MOUNT PLEASANT, MICHIGAN 48858  
517 • 773 • 3949

August 13, 1982

Mr. Robert E. Ives  
Department of Natural Resources  
Geological Survey Division  
4th Floor, Mason Building  
P. O. Box 30028  
Lansing, Michigan 48909

Dear Mr. Ives:

Subject: Casing Removal and Plugging

Upon completion of the coring and logging of the test well covered by attached permit application the well will be abandoned and plugged as follows:

1. Removal of well head used for drilling.
2. Weld on to existing intermediate casing string.
3. Run "free point" to determine amount of casing which can easily be recovered above the top of cement.
4. Run explosive type casing cutter and cut casing.
5. Lay down recovered casing and proceed to plug hole.

Plugging will consist of running open end drill pipe to T.D. and setting continuous cement plugs to surface. The casing will be cut off at least 3 feet below surface and a 1/2" steel plate welded over the top of surface casing stub.

The wooden cellar will be removed and backfilled according to D.N.R. specifications.

Sincerely,

Donald P. Smith  
Exploration Engineer

DPS/jlc





**d. Johnson 2-1, Permit #00377**

Kalium  
377-845-754

Johnson 2-1  
Mecosta

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

MINERAL WELL PLUGGING RECORD

File in DUPLICATE Within 30 Days After Plugging is Completed

AMENDED 1-4-88

PERMIT NUMBER

012-841-354

DATE

5-29-84

OWNER OR OPERATOR

PPG Oil & Gas, Inc.

ADDRESS

2258 Enterprise Drive, Mt. Pleasant, MI 48858

WELL NAME

Johnson

WELL NUMBER

2-1

WELL LOCATION

NW 1/4 SE 1/4 NE 1/4 SEC. 1 T. 16N R. 9W

TOWNSHIP

Grant

COUNTY

Mecosta

TYPE OF WELL (Brine Disposal Storage or Test)

Test

TOTAL DEPTH

8085

FORMATION

Niagaran

DATE PLUGGING STARTED

4-24-84

DATE PLUGGING COMPLETED

4-24-84

WAS PERMISSION OF DEPT. OF NATURAL RESOURCES  
OBTAINED BEFORE PLUGGING BEGAN?

XX ☒ YES

☐ NO

NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING

Gunning

CASING SIZE	WHERE SET	AMOUNT RECOVERED	SHOT OR RIPPED	TYPE OF BRIDGES OR PLUGS	DEPTH PLACED	NUMBER SACKS
13 3/8"	905	----		Set one cement plug	8085	50 sx
9 5/8"	5507	----				
7"	7829	----				

GEOLOGICAL SURVEY

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

Set 1 plug - 50 sx Howcolite at 8082, PBTD 7920

FEB 5 1985

Permits & Bonding Unit

(USE REVERSE SIDE IF NEEDED)

Were tools, tubing, casing, etc., lost or left  
in the hole before or during plugging?

☐ YES

☒ NO

If yes, give details:

Did a Service Company pump mud,  
or cement, or set bridge plugs?

☒ YES

☐ NO

If yes, give name and address:  
Halliburton

Was the well plugged by a Company or  
Contractor other than Owner or Operator?

☐ YES

☒ NO

If yes, give name and address:

Representatives of Owner, Operator, Company, or Contractor who witnessed plugging

Marvin Woods

CERTIFICATE

Donald D. Metzger

of Kalium Chemicals

(company)

I state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction  
and that the facts stated herein are true, correct and complete to the best of my knowledge.

SIGNATURE

ADDRESS

TITLE

11126 140th Ave., Hersey, MI Resident Manager

FINAL INSPECTIONS

DEPARTMENT REPRESENTATIVE

DATE

DEPARTMENT REPRESENTATIVE

DATE

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

MINERAL WELL PLUGGING RECORD

File in DUPLICATE Within 30 Days After Plugging is Completed

PERMIT NUMBER  
012-341-354

DATE  
5/29/84

OWNER OR OPERATOR

PPG Oil & Gas Co., Inc.

ADDRESS

2258 Enterprise Drive, Mt. Pleasant, MI 48858

WELL NAME

Johnson

WELL NUMBER

2-1

WELL LOCATION

NW 1/4 SE 1/4 NE 1/4 SEC. 1 T. 16N R. 9W

TOWNSHIP

Grant

COUNTY

Mecosta

TYPE OF WELL (Brine Disposal Storage or Test)

Test

TOTAL DEPTH

8085

FORMATION

Niagaran

DATE PLUGGING STARTED

4-24-84

DATE PLUGGING COMPLETED

4-24-84

WAS PERMISSION OF DEPT. OF NATURAL RESOURCES  
OBTAINED BEFORE PLUGGING BEGAN?

☒ YES

☐ NO

NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING

Gunning

CASING SIZE	WHERE SET	AMOUNT RECOVERED	SHOT OR RIPPED	TYPE OF BRIDGES OR PLUGS	DEPTH PLACED	NUMBER SACKS
13 3/8"	905	-----		Set one cement plug	8085	50 sx
9 5/8"	5507	-----				
7"	7829	-----				

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

Set 1 plug - 50 sx Howco Lt. at 8082, PBDT 7920

**ORIGINAL SURVEY**

JUN 28 1984

**ORIGINAL SECTION**

(USE REVERSE SIDE IF NEEDED)

Were tools, tubing, casing, etc., lost or left  
in the hole before or during plugging?

☐ YES

☒ NO

If yes, give details:

Did a Service Company pump mud,  
spot cement, or set bridge plugs?

☒ YES

☐ NO

If yes, give name and address:

Halliburton

Was the well plugged by a Company or  
Contractor other than Owner or Operator?

☐ YES

☒ NO

If yes, give name and address:

Representatives of Owner, Operator, Company, or Contractor who witnessed plugging

Marvin Woods

CERTIFICATE

I, William E. Booker of Strickler Geological Services, Inc. (company),  
state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction,  
and that the facts stated herein are true, correct and complete to the best of my knowledge.

SIGNATURE

ADDRESS

TITLE

1425 S. Mission, Mt. Pleasant, MI Geologist

FINAL INSPECTIONS

DEPARTMENT REPRESENTATIVE

DATE

DEPARTMENT REPRESENTATIVE

DATE

[illegible][illegible]

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

MINERAL WELL PLUGGING RECORD

File in DUPLICATE Within 30 Days After Plugging is Completed

AMENDED 1-4-88

PERMIT NUMBER

012-841-354

DATE

5-29-84

OWNER OR OPERATOR

PPG Oil & Gas., Inc.

ADDRESS

2258 Enterprise Drive, Mt. Pleasant, MI 48858

WELL NAME

Johnson

WELL NUMBER

2-1

WELL LOCATION

NW 1/4 SE 1/4 NE 1/4 SEC. 1 T. 16N R. 9W

TOWNSHIP

Grant

COUNTY

Mecosta

TYPE OF WELL (Brine Disposal Storage or Test)

Test

TOTAL DEPTH

8085

FORMATION

Niagaran

DATE PLUGGING STARTED

4-24-84

DATE PLUGGING COMPLETED

4-24-84

WAS PERMISSION OF DEPT. OF NATURAL RESOURCES  
OBTAINED BEFORE PLUGGING BEGAN? ☒ YES ☐ NO

NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING

Gunning

CASING SIZE	WHERE SET	AMOUNT RECOVERED	SHOT OR RIPPED	TYPE OF BRIDGES OR PLUGS	DEPTH PLACED	NUMBER SACKS
13 3/8"	905	----		Set one cement plug	8085	50 sx
9 5/8"	5507	----				
7"	7829	----				

GEOLOGICAL SURVEY

FEB 5 1984

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

Set 1 plug - 50 sx Howco Lt. at 8082, PBTD Permits & Bonding Unit

4-25-84 Halliburton Spotted HOWCO Lite cement plugs - 88 sx @ 7663', 91 sx @ 6847', 91 sx @ 6036', 91 sx @ 5222', 91 sx @ 4411', 91 sx @ 3599', 90 sx @ 2789', 90 sx @ 1981', 62 sx @ 1172', 58 sx @ 622', 42 sx @ 311'. Spotted common cement plugs. Cut 9 5/8" head of 3' below surface. Cap 7" & 9 5/8" casings.

(USE REVERSE SIDE IF NEEDED)

Were tools, tubing, casing, etc., lost or left  
in the hole before or during plugging?

☐ YES ☒ NO

If yes, give details:

Did a Service Company pump mud,  
spot cement or set bridge plugs?

☒ YES ☐ NO

If yes, give name and address:

Halliburton

Was the well plugged by a Company or  
Contractor other than Owner or Operator?

☐ YES ☒ NO

If yes, give name and address:

Representatives of Owner, Operator, Company or Contractor who witnessed plugging

Marvin Woods

I, Donald D. Metzger

CERTIFICATE

of Kalium Chemicals

(company)

state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction and that the facts stated herein are true, correct and complete to the best of my knowledge.

SIGNATURE

Donald D. Metzger

ADDRESS

11126 140th Ave., Hersey,

TITLE

MI

Resident Manager

FINAL INSPECTIONS

DEPARTMENT REPRESENTATIVE

DATE

DEPARTMENT REPRESENTATIVE

DATE

**OPERATORS USE**

**DEPARTMENT USE ONLY**

Supplemental Plugging Data and Site Conditions:



DNR DISTRIBUTION Permittee — Orig. & 1 copy Division Office — 2 copies Field Office — File copy Others — On request	SEP 2 1985 REGULATORY/CONTROL UNIT	STATE OF MICHIGAN DEPARTMENT OF NATURAL RESOURCES GEOLOGICAL SURVEY DIVISION	PERMIT NUMBER MW012-341-354
		PERMIT TO PLUG AND ABANDON	FIELD NAME Hersey

NAME AND ADDRESS OF PERMITTEE PPG Oil & Gas			
LEASE NAME AND WELL NO Johnson #2-1			
LOCATION (1/4 1/4 or other) NW SE NE,	SECTION 1	T 16N R 9W	TOWNSHIP Grant COUNTY Mecosta
TYPE OF WELL (Oil Gas, Dry Hole etc) Min. well	DATE COMPLETED 4/26/84	DATE PLUGGING WILL START a.s.a.p.	PLUGGING PERMIT REQUESTED BY & DATE D. Smith
LAST PRODUCTION BOPD SWPD MCFGPD DATE			PLUGGING TO BE DONE BY Lease Mgmt.
PERMIT MAILED TO COPIES MAILED TO			

## CASING AND CEMENTING RECORD

HOLE DIA.	CASING DIA. & WT./FT.	DEPTHS SET	CEMENT QUANTITY, TYPE, ADDITIVES	CMT. TOP	PERFORATIONS
	13-3/8"	905	700	surf	
	9-5/8"	5507	2100	surf	
	7"	7829	1200	surf	

## GEOLOGIC DATA; GAS AND OIL SHOWS; DRILLING AND COMPLETION DATA:

## PLUGGING REQUIREMENTS\*

Plugging requirements outlined are to be executed in accordance with the provisions of Act 61, P.A. 1939, as amended, and rules and orders adopted thereunder

(Previously PB to 7783')  
 run tubg. to 7783';  
 spot 700 sx lite cmt. and 93  
 sx Cl A cmt.  
 Cut csg off 3' below grd & cap w/  
 cmt. & steel plate.

NOTIFY CADILLAC OFFICE 48 HOURS PRIOR TO PLUGGING.

\*NOTE. BONDS CANNOT BE RELEASED UNTIL A PLUGGING IS COMPLETED, CELLAR RAT HOLE AND PITS FILLED, WELL SITE RESTORED AND RECORDS FILED. WATER WELLS MUST BE PLUGGED ACCORDING TO RULE 166 OF ACT 294 P.A. 1965, "GROUND WATER QUALITY CONTROL". It is further made a requirement of this permit that the applicant give notice to the public utilities in accordance with Act 53, P.A. 1974 C.L. 460.701 to 460.718 and comply with each of the requirements of the act

AUTHORIZED BY (signature) <i>Michael J. Morris</i>	OFFICE Cadillac D#6	DATE 9/19/85
-------------------------------------------------------	------------------------	-----------------

NOTE: WELL PLUGGING RECORD Form R-7213 to be filed in TRIPLICATE within 30 days after completion

MINERAL WELL COMPLETION REPORT  
TO BE FILED WITH THE SUPERVISOR WITHIN 60 DAYS  
AFTER COMPLETION OF WELL (ACT 315 P.A. 1969)

SUBMIT IN  
TRIPLICATE

NAME OF OWNER OR OPERATOR PPG Oil & Gas Co., Inc.		ADDRESS OF OWNER OR OPERATOR 2258 Enterprise Drive Mt. Pleasant, MI 48858	
NAME OF DRILLING CONTRACTOR I. D. Provins Drilling Co.		ADDRESS OF DRILLING CONTRACTOR 2113 Enterprise Drive Mt. Pleasant, MI 48858	
WELL NAME Johnson		WELL NUMBER 2-1	PERMIT NUMBER 012-341-354
LOCATION Surface: NW SE NE Subsurface: SE NE		SECTION 1	TWP. 16N RANGE 9W
TOWNSHIP Grant		COUNTY Mecosta	
FOOTAGE 1077 Ft from South Line and 1267 Ft from East Line of quarter section N or S E or W			
DATE DRILLING COMMENCED 3-24-84	DATE DRILLING COMPLETED 4-23-84	DATE WELL COMPLETED 4-26-84	TYPE OF WELL Test
FORMATION COMPLETED IN Al Evaporite	TOTAL DEPTH 8085	ELEVATION KB -172	RB RT RF 1171 GN 1156
ROTARY TOOLS From 0 Feet to 8085 Feet		CABLE TOOLS From Feet to Feet	

WELL CASING RECORD

TUBING AND CASING DATA				CEMENTING DATA			PERFORATIONS OR OPEN HOLE		
SIZE	LB./FT.	GRADE	DEPTH	SACKS	TYPE	STAGING DEPTH(S)	NO. HOLES	FROM	TO
13 3/8"	54.5#	K-55	905	500,200	Lite/C1A	Circ. 70 bbls			
9 5/8"	45.5#	N-80	5507	700,200	Lite/C1A	5507-3700			
				1100,100	Lite/C1A	3700-Surface			
7"	23#	S-95	7829	475,450	Lite/Poz				
				280	Hw .2% HR7				

WATER ZONES

WIRE LINE LOGS RUN

FORMATION	FROM	TO	AMOUNT	SERVICE COMPANY	TYPE LOG	INTERVAL LOGGED	COPY TO SURVEY
(Fresh)				Schlumberger	LDT-CNL-GR	0 - 8085	---
					Dual & Micro	3024 - 4200	

FRACTURE OR ACID TREATMENT

SOLUTION MINING

DATE	FROM	TO	QUANTITY	NAME AND NUMBER OF INJECTION AND TARGET WELL - DISTANCE APART

The information in and attached to this report is complete and correct

SIGNATURE

*William E Book*

TITLE

Geologist

DATE

5/29/84

GIVE COMPLETE FORMATION RECORD ON REVERSE SIDE



PPG Industries, Inc. One PPG Place Pittsburgh, Pennsylvania 15272

May 15, 1984

Michigan Department of Natural  
Resources  
Stevens T. Mason Building  
P.O. Box 30028  
Lansing, MI 48909

ATTENTION: A. J. Rarick

Dear Mr. Rarick:

Enclosed please find an original and two copies of our Application for a Mineral Well Permit relating to the conversion of the Johnson #2-1 well to a solution mining well. Also enclosed is a check for the fee in the amount of \$50.00.

If you require any additional information, please contact me at (412) 434-3907.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Joseph Gil, Jr.' with a stylized flourish at the end.

Joseph Gil, Jr.

JG:rm  
Enclosures

cc: (w/enclosures)

D. D. Metzger  
G. F. Pellett  
R. J. Sameison  
L. H. Wilcox  
RES 969.0

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

## APPLICATION FOR A MINERAL WELL PERMIT

To Drill, Operate, Convert, or Rework  
a Brine, Storage, Disposal, or Test Well.

By Authority of Act 315, P. A. 1969

1. DATE OF APPLICATION May 16, 1984	2 FEE ENCLOSED \$50.00
3. APPLICATION TO Convert to Solution Mining	
4 TYPE MINERAL WELL Solution Mining	5. WELL DESIGNATION Johnson 2-1
6 LOCATION: NW/4 of the SE/4 of the NE 1/4 SEC 1 T 16N R 9W	
7 TOWNSHIP Grant	8 COUNTY Mecosta

9 APPLICANT PPG Industries, Inc.		10. TELEPHONE (412)434-3907	
11. ADDRESS (Street, City State) One PPG Place, Pittsburgh, PA		12 ZIP CODE 15272	
13 SURETY OR SECURITY COMPANY Hartford Accident & Indemnity Co.	14. TYPE <input type="checkbox"/> SINGLE <input checked="" type="checkbox"/> BLANKET	15 AMOUNT \$25,000.00	16 BOND NO 4506230
17 OWNER OR SURFACE RIGHTS Donald and E. Caroline Johnson	18 OWNER OR MINERAL RIGHTS Gerald Knapp, et al		
19 DRILLING CONTRACTOR T. D. Provins	20 ADDRESS P.O. Box 642, Mt. Pleasant, MI 48858		21 TELEPHONE (517)773-6946
22 TYPE DRILLING TOOLS <input type="checkbox"/> CABLE <input checked="" type="checkbox"/> ROTARY <input type="checkbox"/> COMBINATION	23 FORMATION Niagaran		24 INTENDED DEPTH 8000'
25. PROJECT ENGINEER OR GEOLOGIST Donald D. Metzger	26 ADDRESS 2258 Enterprise Drive, Mt. Pleasant, MI 48858		27. TELEPHONE (517)773-3949

28 PROGRAM OF DRILLING CONVERTING REWORKING, CASING, CEMENTING, COMPLETING OPERATING, AND MONITORING.  
(See appropriate instruction sheet Attach 3 copies of proposed program - including but not necessarily limited to information requested in the instruction sheet.)

## CASING PROGRAM:

Size Depth Cement

See Attached

INSTRUCTION SHEET NO.		
Type of Well	Drill-New	Rework*
Brine	D-1	R-1
Storage	D-2	R-1
Disposal	D-3	R-1
Solution Mining	D-4	R-2 <input checked="" type="checkbox"/>
Test Well	D-5	R-1

\*Rework, Deepen, or Convert to New Use

THERE WILL BE NO CHANGES IN THE PROGRAM OUTLINED IN THIS APPLICATION WITHOUT APPROVAL OF THE SUPERVISOR OF MINERAL WELLS OR HIS AUTHORIZED REPRESENTATIVE.

29 ADDRESS CORRESPONDENCE AND PERMIT TO: PPG Industries, Inc., One PPG Place, Pittsburgh, PA 15272 ATTENTION: J. Gil, Jr.	30 TELEPHONE (412)434-3907
------------------------------------------------------------------------------------------------------------------------------	-------------------------------

## MINERAL WELL SECTION USE ONLY

STATUS OF BOND

Effects

APPLICATION APPROVED BY

*Joseph Gil, Jr.*

PERMIT NUMBER

377 010-845-754

DATE ISSUED

5/31/84

ISSUED BY

*Joseph Gil, Jr.*

DISTRIBUTION:

White - Lansing  
Canary - Field  
Pink - Applicant

6924

5001

The Applicant agrees to comply with provisions and requirements of Act 315, P.A. 1969, and asserts that the information on this application and attached report is true and correct.

SIGNATURE (APPLICANT/AUTHORIZED REP.)

*Joseph Gil, Jr.*

DATE

5/16/84

NAME (TYPED)

Joseph Gil, Jr.

TITLE

Project Manager

FOR CASHIER'S USE ONLY

R 7500 2/73

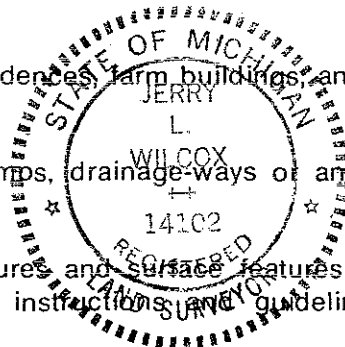
STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

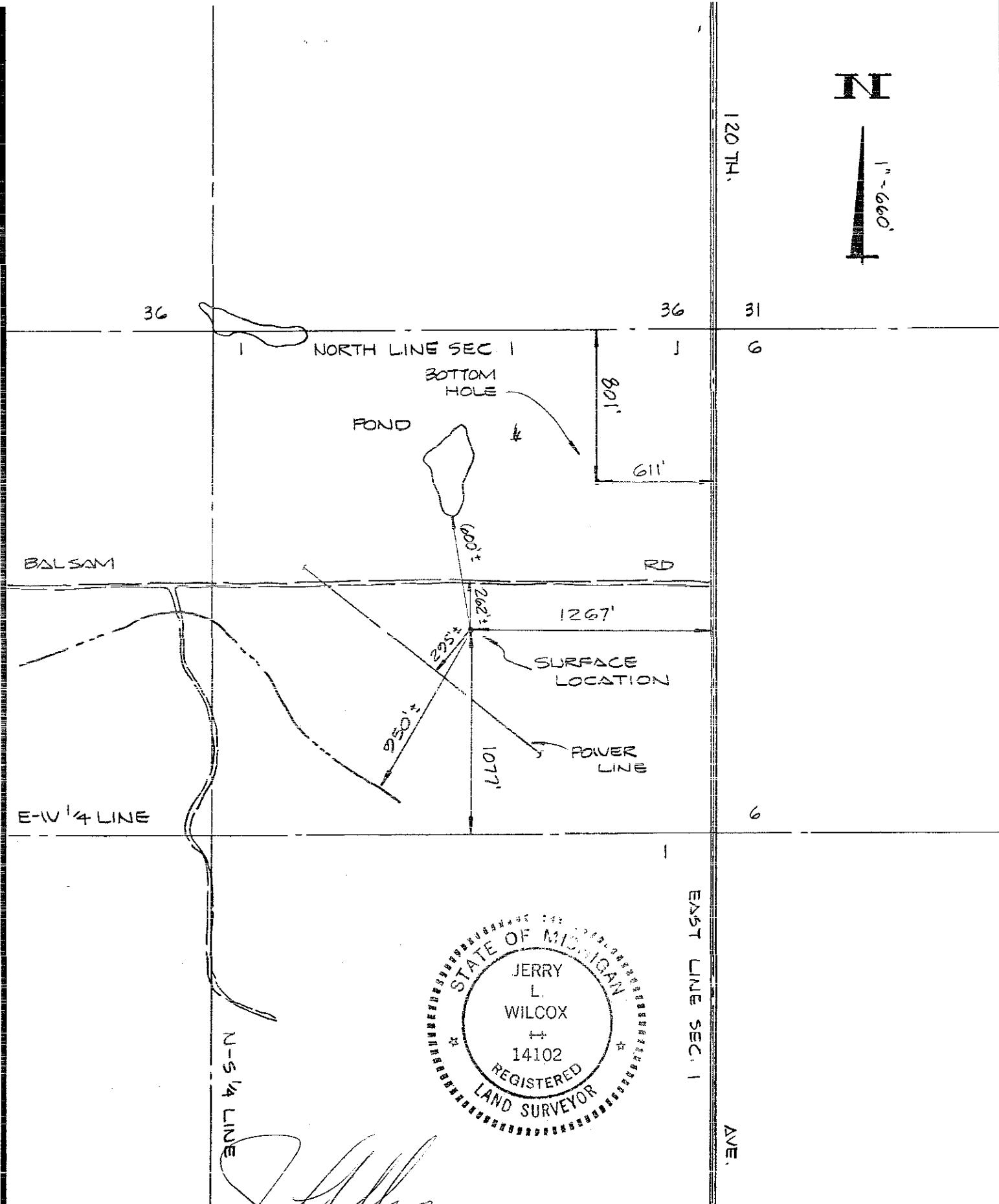
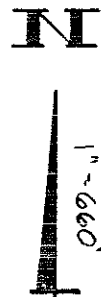
# **SURVEY RECORD OF WELL LOCATION**

(Submit five copies with Application for Permit to Drill a Well for Oil or Gas,  
Brine Disposal, Hydrocarbon Storage or Secondary Recovery)

84024

LESSEE (OWNER OF LEASE RIGHTS) <b>PPG INDUSTRIES, INC.</b>	
LESSOR (OWNER OF MINERAL RIGHTS) <b>(Johnson #2-1)</b>	WELL NO. <b>2-1</b>
LOCATION <b>NW</b> $\frac{1}{4}$ OF <b>SE</b> $\frac{1}{4}$ OF <b>NE</b> FRC'L $\frac{1}{4}$ SECTION <b>1</b> T. <b>16 N</b> R. <b>9 W</b>	
TOWNSHIP <b>Grant</b>	COUNTY <b>Mecosta</b>
PLAT BELOW REPRESENTS ONE FULL SECTION (1 Mile Square) <div style="text-align: right; margin-top: 10px;"> </div>	<ol style="list-style-type: none"> <li>Outline drilling unit and spot well location on plat at left. Where drilling unit crosses section lines, divide the plat into an east half and a west half <b>OR</b> a north half and a south half (which ever applies). Outline the unit and locate the well in two directions from <b>NEAREST</b> quarter section and unit lines.</li> <li>Location of well in two directions from <b>NEAREST</b> quarter section and unit lines is:  <div style="margin-left: 40px;"> <b>SURFACE LOCATION</b>  <u>1077</u> ft. from <u>South</u> line of Quarter Section  <small>(north-south)</small>  <u>1267</u> ft. from <u>East</u> line of Quarter Section  <small>(east-west)</small>            _____ ft. from _____ line of unit  <small>(north-south)</small>            _____ ft. from _____ line of unit  <small>(east-west)</small> </div> </li> <li>Describe wellsite marker. Show or describe access route if it is not readily accessible.  <u>Wellsite is marked with an existing casing. Site can be reached from the North off Balsam Road. See supplemental plat.</u>            _____            _____            Ground elev. = <u>1156.4</u> feet, U.S.G.S. datum.         </li> </ol>
(Scale of Plat - 1 inch equals 1320 ft.)	
<b>4. ON SEPARATE PLAT OR PLOT PLAN:</b> <ol style="list-style-type: none"> <li>Locate, identify, and show distances to all roads, power lines, residences, farm buildings, and other structures within 300 feet of the stake;</li> <li>Locate, identify, and show distances to all lakes, streams, swamps, drainage ways or any other surface water features within 1320 feet of the stake</li> </ol>	
<b>5. In an ENVIRONMENTAL IMPACT ASSESSMENT</b> describe all structures and surface features shown detailing plans for hazards prevention and erosion control (See instructions and guidelines for preparation of an environmental impact assessment).	
NAME OF INDIVIDUAL WHO SURVEYED WELL SITE 	DATE <b>5-4-84</b>
Jerry L. Wilcox, LS#14102	TITLE <b>President</b>
ADDRESS <b>J. L. WILCOX &amp; ASSOCIATES, INC. 7230 North U.S.-131 Manton, Michigan 49663</b>	
I CERTIFY THE ABOVE INFORMATION IS COMPLETE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF	
SIGNATURE (LESSEE OR AUTHORIZED REPRESENTATIVE)	DATE (MONTH, DAY, YEAR)





SUPPLEMENTAL PLAT; JOHNSON\*2-1  
SECTION 1, T16N-R21W  
GRANT TOWNSHIP, MECOSTA  
COUNTY, MICHIGAN

CLIENT: PPG INDUSTRIES INC

DATE  
5-4-84  
DRN  
R.M.  
CHD  
FHT  
SCALE  
V. 1"=660'  
H. 1"=660'

J.L. WILCOX & ASSOCIATES, INC.  
Engineers and Surveyors  
7230 N. U.S. - 131 • Manton, Michigan 49663

NOTES F.B. 120 PG. 57	SHEET 1 OF 1	JOB NO. 84024
-----------------------------	-----------------	------------------

## Section 28 - Solution Mining Well Program

### I. Drilling and Completion Programs

The Johnson 2-1 was drilled and cased according to the following:

#### A. Surface

1. The 24" conductor pipe was driven to a depth of 96.5'.
2. A 17-1/2" hole was drilled to a depth of 905'.
3. Then 13-3/8" 54.0# K-55 S.T.C. was run to total depth. A weld-on guide shoe was placed on bottom and the lower five joints were strapped across the collars.
4. Surface casing was cemented with 525 sacks HOWCO lite and 200 sacks Class A cement. Seventy barrels of cement were returned to surface on the outside of the casing.
5. Blowout preventor equipment was installed on 13-3/8" casing and the equipment was pressure tested to 1500 psi for 15 minutes.

#### B. Intermediate Hole

1. A vertical 12-1/4" hole was drilled from below the surface casing to 4240'.
2. The hole was then directionally drilled NE of the surface location to a depth of 5545' measured depth (MD) with an angle of 22-1/4° N37E at 5456' MD.
3. The 9-5/8" 40# N-80 L.T.C. casing was then run using a float shoe on the bottom and a float collar at the top of the first joint with 7 centralizers installed midway on every second joint. The centralizers were held in place with stop rings. A D.V. tool was installed in the casing string approximately 3710' from the surface.
4. The 9-5/8" casing was cemented to the surface. The first stage was cemented with 700 sacks HOWCO lite with 2% CaCl and 200 sacks Common Class A. The D.V. tool was then closed and the second stage was cemented using 1100 sacks HOWCO lite with 2% CaCl and 100 sacks Common Class A with 2% CaCl.
5. Twenty barrels of cement were returned on the first stage. Forty barrels of cement were returned on the second stage.

#### C. Production Casing

1. The blowout preventor equipment (BOPE) was installed on the 9-5/8" casing and was tested to 1500 psi for 15 minutes using the rig pump.
2. The D.V. tool was drilled out along with the float collar and the float shoe. The drilling of an 8-1/2" hole commenced from below intermediate casing.

3. The hole was drilled using the build and drop method, with the angle of the hole being back to vertical at approximately 7765'. The maximum angle achieved was 24-1/2°.
4. The hole was cored through the zone of potash mineralization.
5. Drilling continued to a total depth of 8082', ten feet into the Niagaran formation.
6. Geophysical logs and a gyro survey were run.
7. The hole was plugged back from total depth to approximately 7850' with 50 sacks of HOWCO lite.
8. Seven inch 23# S-95 L.T.C. casing was run with a float shoe and centralizer on the bottom. A float collar with manual fill was run one joint up with the centralizers midway between joints and held in place with a stop ring.
9. Two more joints were run and a short marker pup was installed in the production string.
10. Casing was run continuously to surface.
11. The casing was cemented with 475 sacks HOWCO lite A, salt saturated with 1/4# per sack D-Air-1, 450 sacks HOWCO poz 18% salt and 1/4# per sack D-Air-1, and 280 sacks HOWCO special H with .2% HR-7.
12. Forty barrels of cement were returned to surface around the outside of the pipe.
13. The casing was landed in slips at 7838' and capped with a temporary blank pending approval of the application for a permit to convert the well to a solution mining well.

#### D. Geophysical Logging

In addition to the logs run at intermediate casing point, gamma ray, neutron and other lithology indicating logs are run from the base of the intermediate casing to the top of the Niagaran formation. Later, when the cement plugs are drilled out to below the zone of mineralization, a series of cased hole-logs will be run. A cement bond log and collar locator will be run from total depth to surface. The depth of the casing is checked using a collar locator log to locate the marker joint.

#### E. Tests

The pressure testing of the 7" casing to 80% of burst pressure will take place prior to the initial mining. This pressure exceeds 133% of operating pressure. A packer will run to the bottom and the pressure checked in the final stages before mining commences.

#### F. Mining Interval

Mining will be commenced in the salt a short distance above the bottom of the 7" casing. The exact depth depends on the depth at which the potash bed is encountered in the Johnson 3-1. Mining will be continued up through the salt and potash sections to a height up to approximately 6458' to 6428', subsea.



### G. Well Area

The well head will be surrounded by a concrete and steel sump. This sump will drain by gravity through a pipeline into a sump within the test mining facility processing building, where any leakage will be captured by a sump pump and reinjected into the circulating fluid system.

## II. Operation

### A. Solutioning System

#### 1. Single Well Operation

- a) The well will be initially operated as a single well with annulus injection and tubing withdrawal. Oil will be used as the inert padding system for roof control in the cavern. Oil will be added to the well on a batch basis as required. The well will be operated as a single well until the cavity size is large enough to connect with an adjacent cavity (Johnson 3-1). It will then be operated in multi-well operation.

#### 2. Multi-Well Operation

- a) After connection has been established the well will be operated as a two well gallery. Each well may be operated as an injection or withdrawal well in the multi-well mode. Oil padding will continue to be used for roof control throughout the multi-well phase. The well will be operated in the multi-well mode until sufficient data have been collected from the test. It is anticipated that this phase of the operation will take between 160 and 200 days to complete.

### B. Operating Parameters

1. Average injection flow will range from 50 gpm to 390 gpm with short-term peak flow to 600 gpm.
2. Withdrawal flow will be approximately 97% of injection. No losses are anticipated to the formation.
3. Injection temperature will range from 50°F to 180°F.
4. Injection pressure will depend on the injection flowrate and the density difference of the injection and withdrawal fluids. It is anticipated that the injection pressure will range between 900 and 1300 psig.
5. Specific gravity of the withdrawal fluid will range between 1.0 (water) and 1.25.
6. Chemical composition of the withdrawal fluid will depend on the ore being dissolved and is anticipated to range from nearly pure water to an aqueous solution of sodium chloride (NaCl) and potassium chloride (KCl) containing up to 435 gpl combined dissolved NaCl and KCl.

7. The only pre-treatment of the injection fluid (water) will be heating of the water to 180°F during certain stages of the solution mining test. Chemical pre-treatment is not required.

### III. Monitoring

#### A. Operating Parameters

The injection and withdrawal flowrate for the well(s) will be monitored by totalizing flowmeters. Flow information along with the chemical analysis of injection and withdrawal as determined from daily composite samples will be used to perform daily material balances on the solution mining process. The material balances will provide a daily accounting of the KCl and NaCl withdrawn from the well(s).

#### B. Well Integrity and Solutioning Process

1. The well head and surface equipment will be visually monitored by operators who will be on duty 24 hours per day, seven days per week, throughout the test.
2. The condition of the borehole, casing, and cement sheath will be determined by monitoring the pressure when the well is operating. If any loss of fluid (other than expansion of the cavity) is indicated from a comparison of the injection and withdrawal flowmeters, pressure and/or video testing of the casing will be performed to locate leaks.

#### C. Surface Changes

In order to monitor any ground surface movement at the well area, two bench marks will be established on the site. These bench marks will be located at least 200 feet away from the area in which the cavity will be formed. The bench marks will be a precast concrete monument approximately 4 inches in diameter and 3 to 4 feet long having a 1/2 inch diameter reinforcing rod embedded in the center. The monument will be buried in the ground vertically having one end exposed. A monument grid will be utilized. The grid will be made up of four additional bench marks which will be placed over the cavity. A survey of second order accuracy will be conducted to determine the elevation of the monuments in the grid relative to the bench marks. These will be measured annually and reported to DNR every two years.

PPG INDUSTRIES, INC.

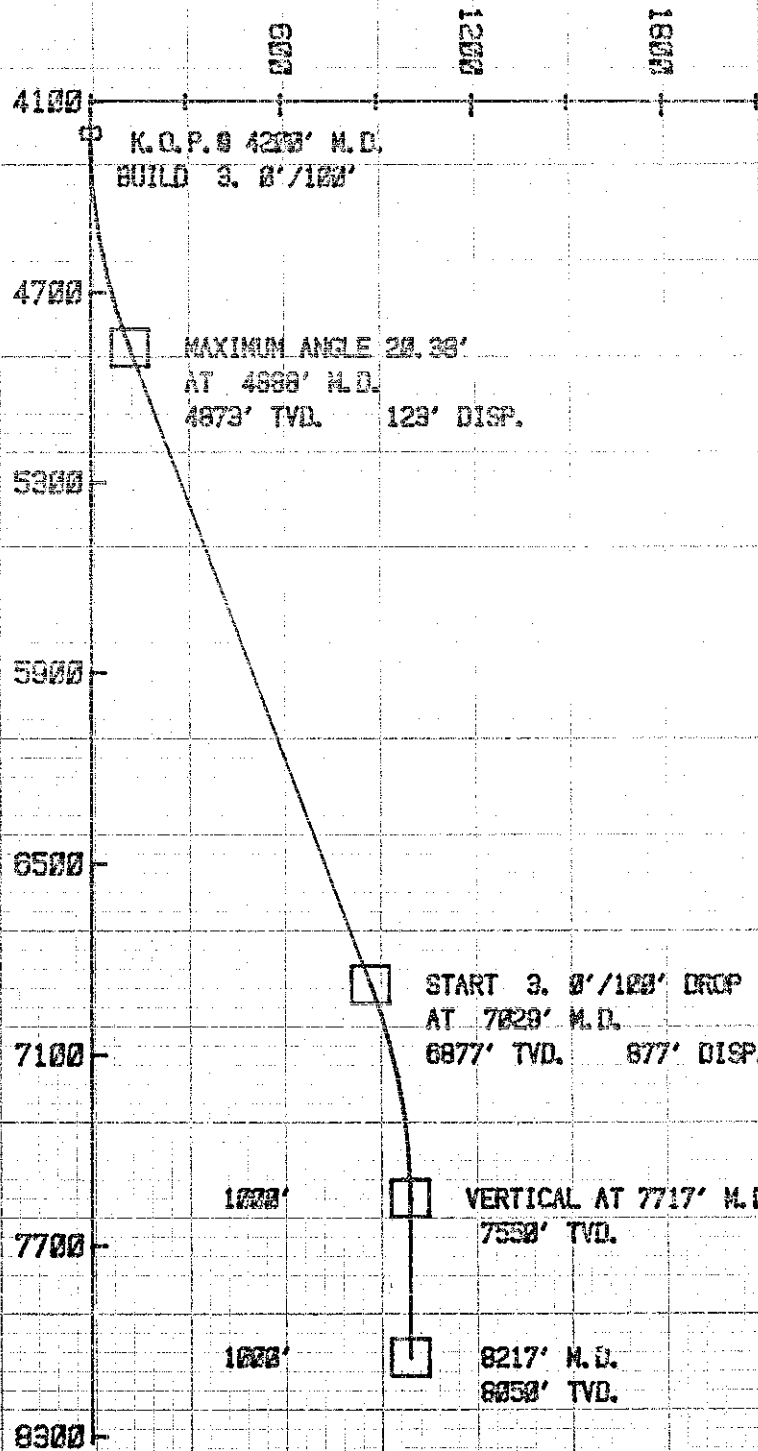
JOHNSON 2-1

MECOSTA COUNTY, MICHIGAN

VERTICAL SECTION 1 IN. = 600 FT.

feet

feet



PPG INDUSTRIES, INC.

JOHNSON 2-1

MECOSTA COUNTY, MICHIGAN

PLAN VIEW  
1 IN. = 200 FT.



feet

OBJECTIVE NO. 1:

1000' N45.00'E OF  
SURFACE LOCATION

7717' M.D. 7550' TVD.

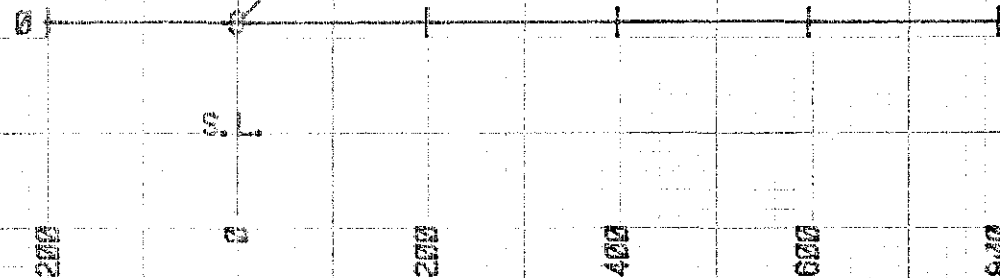
707' NORTH 707' EAST

OBJECTIVE NO. 2:

1000' N45.00'E OF  
SURFACE LOCATION

8217' M.D. 8050' TVD.

707' NORTH 707' EAST



SUBMITTED BY:

TRIPLE G DIRECTIONAL DRG.  
TRAVERSE CITY, MICHIGAN

the applicant to allow all-weather operation. The environmental effect of this project is slight, and every effort will be made to insure protection and preservation of the environment during the course of operations.

Applicant's Representative

Joseph J. H.

Comments by Department of Natural Resources Representative:

Authorized Representative

PPG Oil & Gas Co., Inc.

A Subsidiary of PPG Industries, Inc.

2258 Enterprise Drive Mt. Pleasant, Michigan 48858 (517) 773-3949



*File*

June 26, 1984

Supervisor of Mineral Wells  
Geological Survey Division  
Department of Natural Resources  
P.O. Box 30028  
Lansing, MI 48909

Re: Johnson 2-1 Reports and Logs

Gentlemen:

Enclosed are the following reports and logs for the Johnson 2-1:

Form R7506-1, Mineral Well Plugging Record - 2 copies

Form R7504, Mineral Well Completion Report - 3 copies

Sample Descriptions - 2 copies

Final Logs:

Dual Laterolog/Micro SFL/GL

Compensated Neutron-Litho Density, Run 1 & 2

Directional Survey

Upon receipt, please sign below and return one copy to our office.

Sincerely,

*Janet Caltrider*

Janet Caltrider  
Operations Staff Assistant

**GEOLOGICAL SURVEY**

JUN 28 1984

**MINERAL WELL SECTION**

JC/11h  
Enclosures

Received on 6/29/84, 1984, by W. A. Rauti

W.C.

**TRIPLE-G**  
**REPORT**  
*of*  
**SUB-SURFACE**  
**DIRECTIONAL**  
**SURVEY**

GEOLOGICAL SURVEY

JUN 28 1984

GENERAL WELL SECTION

PPG Oil & Gas Company, Inc.  
COMPANY

Johnson #2-1  
WELL NAME

Mecosta County, Michigan  
LOCATION

JOB NUMBER

TC-MJ-40052

TYPE OF SURVEY

Gyroscopic & Single Shot Survey

DATE

04/23/84

SURVEY BY  
Burdick

OFFICE  
Michigan

# RECORD OF SURVEY

Triple "G" Directional Drilling, Inc.

Objective N45.00E

JOB NO. 40062

DATE 4/23/84

Checked by

MEASURED DEPTH	DRIFT ANGLE	TRUE VERTICAL DEPTH	VERTICAL SECTION	DOG LEG	DRIFT DIR.	RECTANGULAR COORDINATES			
						NORTH	SOUTH	EAST	WEST
100.00	.04	100.00	-.04	.07	S87.30W		.00		.06
200.00	.07	200.00	-.15	.05	N78.48W	.01			.22
300.00	.03	300.00	-.11	.14	N25.48E	.12			.27
400.00	.07	400.00	-.06	.16	S07.12W	.09			.18
500.00	.05	500.00	-.21	.05	S31.54W		.07		.23
600.00	.04	600.00	-.32	.10	N63.00W		.10		.35
700.00	.05	700.00	-.24	.15	S89.06E		.01		.35
800.00	.10	800.00	-.17	.13	S36.00E		.11		.14
900.00	.07	900.00	-.23	.05	S28.24E		.32		.01
1000.00	.08	1000.00	-.40	.23	N73.36W		.45		.12
1100.00	2.35	1099.96	.40	2.62	N28.54E	1.46			.90
1200.00	2.10	1199.88	4.41	.43	N31.42E	5.04		1.19	
1300.00	2.19	1299.80	8.24	.23	N36.06E	8.29		3.37	
1400.00	1.51	1399.73	11.85	.51	N41.30E	11.12		5.65	
1500.00	1.43	1499.69	14.96	.15	N59.36E	13.48		7.67	
1600.00	1.43	1599.64	17.95	.22	N46.54E	15.66		9.72	
1700.00	1.20	1699.60	20.61	.39	N44.42E	17.52		11.63	
1800.00	1.20	1799.58	22.94	.06	N42.00E	19.21		13.23	
1900.00	1.07	1899.55	25.07	.24	N46.54E	20.74		14.72	
2000.00	1.02	1999.54	26.95	.09	N44.42E	22.04		16.07	
2100.00	1.10	2099.52	28.87	.15	N41.42E	23.44		17.38	
2200.00	1.39	2199.49	31.31	.60	N56.06E	25.05		19.23	
2300.00	2.20	2299.43	34.53	.99	N77.06E	26.43		22.40	
2400.00	3.12	2399.31	38.06	1.32	S81.54E	26.63		27.20	
2500.00	3.46	2499.12	41.25	.84	S71.36E	25.24		33.10	
2600.00	4.21	2598.87	43.77	.99	S60.12E	22.35		39.55	
2700.00	4.55	2698.55	45.03	1.15	S47.48E	17.61		46.08	
2800.00	4.47	2798.19	45.32	.20	S46.06E	11.84		52.25	
2900.00	4.02	2897.89	45.64	.77	S48.36E	6.63		57.91	
3000.00	4.11	2997.63	45.82	.34	S44.18E	1.70		63.10	



# RECORD OF SURVEY

Triple 'G', Directional Drilling, Inc.

Objective N45.00E

JOB NO. 40062

DATE 4/23/84

Checked by

MEASURED DEPTH	DRIFT ANGLE	TRUE VERTICAL DEPTH	VERTICAL DOG SECTION LEG	DRIFT DIR.	RECTANGULAR COORDINATES			
					NORTH	SOUTH	EAST	WEST
3100.00	3.39	3097.40	45.84	.55 S46.06E		3.11	67.94	
3200.00	3.09	3197.22	46.41	.72 S54.48E		6.89	72.51	
3300.00	2.44	3297.09	47.42	.45 S58.00E		9.73	76.79	
3400.00	2.29	3396.99	48.46	.25 S58.30E		12.12	80.66	
3500.00	1.44	3496.92	49.36	.75 S59.48E		14.01	83.81	
3600.00	1.15	3596.89	50.20	.52 S67.36E		15.16	86.15	
3700.00	1.23	3696.86	50.85	.31 S55.24E		16.25	88.16	
3800.00	.52	3796.84	51.33	.54 S62.54E		17.26	89.85	
3900.00	.36	3896.83	51.79	.28 S69.24E		17.78	91.02	
4000.00	.33	3996.83	52.17	.07 S65.06E		18.16	91.94	
4100.00	.57	4096.82	52.37	.49 S43.00E		18.93	92.99	
4200.00	.21	4196.81	52.35	.60 S44.18E		19.75	93.78	
4220.00	.29	4216.81	52.35	.67 S47.00E		19.85	93.88	
4300.00	4.48	4296.71	54.53	5.87 N58.00E		20.18	97.29	
4400.00	10.22	4395.79	67.48	5.59 N53.48E		12.79	108.22	
4500.00	13.50	4493.56	87.93	7.72 N20.06E	3.72		120.63	
4600.00	20.00	4589.18	114.91	6.40 N26.06E	30.46		132.04	
4700.00	16.48	4684.06	145.36	4.01 N33.48E	57.79		147.78	
4800.00	16.22	4779.90	173.42	.59 N35.12E	81.31		163.95	
4900.00	15.37	4876.03	200.60	.77 N35.54E	103.72		179.97	
5000.00	15.06	4972.46	226.79	.61 N37.06E	125.01		195.72	
5100.00	15.10	5068.99	252.66	.07 N37.12E	145.82		211.49	
5200.00	17.10	5165.03	280.25	2.00 N37.36E	167.94		228.40	
5300.00	19.30	5259.95	311.40	2.37 N36.18E	193.08		247.30	
5400.00	21.21	5353.66	345.86	1.87 N35.30E	221.34		267.77	
5500.00	23.13	5446.18	383.20	1.90 N34.36E	252.38		289.54	
5600.00	24.19	5537.70	422.84	1.10 N34.42E	285.54		312.45	
5700.00	23.49	5629.01	462.96	.50 N34.36E	319.08		335.64	
5800.00	22.40	5720.89	501.81	1.17 N35.12E	351.45		358.22	
5900.00	21.33	5813.54	538.92	1.13 N35.42E	382.11		380.04	

# RECORD OF SURVEY

Triple 'G', Directional Drilling, Inc.

Objective N45.00E

JOB NO. 40062

DATE 4/23/84

Checked by

MEASURED DEPTH	DRIFT ANGLE	TRUE VERTICAL DEPTH	VERTICAL SECTION	DOG LEG	DRIFT DIR.	RECTANGULAR COORDINATES			
						NORTH	SOUTH	EAST	WEST
6000.00	22.21	5906.29	575.85	.87	N36.36E	412.29		402.09	
6100.00	22.43	5998.65	613.75	.38	N36.16E	443.11		424.86	
6200.00	22.57	6090.82	652.16	.42	N37.12E	474.21		448.08	
6300.00	23.16	6182.79	691.01	.39	N36.36E	505.59		471.64	
6400.00	23.58	6274.42	730.63	.70	N36.24E	537.79		495.47	
6500.00	21.52	6366.52	769.09	2.12	N35.36E	569.30		518.36	
6600.00	18.36	6460.34	803.21	3.27	N35.48E	597.38		538.54	
6700.00	16.03	6555.79	832.58	2.55	N35.16E	621.60		555.85	
6800.00	12.58	6652.59	857.24	3.10	N34.06E	642.20		570.11	
6900.00	11.00	6750.41	877.66	1.98	N35.12E	659.28		581.92	
7000.00	10.15	6848.69	895.78	.82	N33.24E	674.51		592.31	
7100.00	9.42	6947.18	912.75	.55	N33.36E	688.95		601.87	
7166.00	10.00	7012.21	923.94	2.22	N42.00E	697.86		608.78	
7259.00	9.15	7103.90	939.47	.83	N43.00E	709.33		619.28	
7352.00	8.00	7195.84	953.41	1.35	N42.00E	719.61		628.71	
7445.00	7.00	7288.05	965.53	1.08	N42.00E	728.63		636.83	
7539.00	6.30	7381.40	976.57	.65	N45.00E	736.65		644.43	
7633.00	5.45	7474.86	986.60	.83	N47.00E	743.61		651.65	
7700.00	4.00	7541.61	991.82	5.34	N85.00E	745.89		656.75	
7750.00	1.15	7591.56	993.97	7.09	N25.00E	747.14		658.55	
7800.00	2.00	7641.54	995.16	1.99	N01.00E	748.51		658.86	
7820.00	2.00	7661.52	995.61	2.09	N11.00W	749.21		658.80	
7891.00	3.30	7732.44	997.52	2.11	N11.00W	752.55		658.15	
7982.00	3.00	7823.29	1000.38	.55	N11.00W	757.61		657.17	
8082.00	3.00	7923.16	1003.37	0.00	N11.00W	762.75		656.17	

BOTTOM HOLE CLOSURE - 1006.20 FT. at N 40 DEG. 42 MIN. E

METHOD OF COMPUTATION - RADIUS OF CURVATURE

**e. Johnson 3-1, Permit #00337**

Kalium  
P.N. 337-844-954

Johnson #3-1  
Mecosta Co

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

AMENDED 1-27-88

MINERAL WELL PLUGGING RECORD

File in DUPLICATE Within 30 Days After Plugging is Completed

PERMIT NUMBER  
337-844-754

DATE  
7/30-84

OWNER OR OPERATOR

PPG Oil & Gas Co., Inc.

ADDRESS

2258 Enterprise Drive, Mt. Pleasant, MI 48858

WELL NAME

Johnson

WELL NUMBER  
3-1

WELL LOCATION

NW ¼ SE ¼ NE ¼ SEC. 1 T. 16N R. 9W

TOWNSHIP  
Grant

COUNTY  
Mecosta

TYPE OF WELL (Brine Disposal Storage or Test)

Test Well

TOTAL DEPTH  
8073

FORMATION  
Niagaran

DATE PLUGGING STARTED

7-4-84

DATE PLUGGING COMPLETED

7-5-84

WAS PERMISSION OF DEPT. OF NATURAL RESOURCES  
OBTAINED BEFORE PLUGGING BEGAN?

☒ YES ☐ NO

NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING

CASING SIZE	WHERE SET	AMOUNT RECOVERED	SHOT OR RIPPED	TYPE OF BRIDGES OR PLUGS	DEPTH PLACED	NUMBER SACKS
13 3/8	905	None	----	Cement	8118	100 sx
9 5/8	5575	None	----	Cement	7823	365 sx
				Cement	6000	200 sx

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

Ran drill pipe open ended to 8118' and spotted 100 sx, pulled drill pipe to 7823' and spotted 365 sx. pulled drill pipe to 6000 and spotted 200sx.

GEOLOGICAL SURVEY

PLEASE REVERSE SIDE IF NEEDED

Were tools tubing casing, etc., lost or left  
in the hole before or during plugging?

☐ YES ☒ NO

If yes, give details

Permits & Bonding Unit

Did a Service Company pump mud,  
spot cement, or set bridge plugs?

☒ YES ☐ NO

If yes, give name and address:

Was the well plugged by a Company or  
Contractor other than Owner or Operator?

☐ YES ☒ NO

If yes, give name and address:

Representatives of Owner Operator Company or Contractor who witnessed plugging

Marvin Wood

CERTIFICATE

Donald D. Metzger

of Kalium Chemicals

(company):

I state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction and that the facts stated herein are true, correct and complete to the best of my knowledge.

SIGNATURE

ADDRESS

TITLE

11126 140th Ave, Hersey, MI Resident Manager

FINAL INSPECTIONS

DEPARTMENT REPRESENTATIVE

DATE

DEPARTMENT REPRESENTATIVE

DATE

MAKING HIS COPY

(Submit in TRIPLICATE Within 30 Days After Plugging is Completed)

PERMIT NUMBER
MW337-844-754
FIELD NAME
Hersey

<u>COMPLETE NAME(S) AND ADDRESS OF WELL OWNER</u> PPG Oil & Gas Co., Inc., 2258 Enterprise Drive, Mt. Pleasant, MI 48858			
<u>COMPLETE LEASE OR FARM NAME(S)</u> Johnson 3-1			WELL NUMBER 3-1
<u>WELL LOCATION</u> NW 1/4 SE 1/4 NE 1/4 SEC. 1 T. 16N R. 9W		TOWNSHIP Grant	COUNTY Mecosta
<u>TYPE OF WELL (Oil, Gas, Dry Hole, etc.)</u> Mineral well		TOTAL DEPTH 8073	FORMATION Niagaran
<u>DATE PLUGGING STARTED</u> 9-11-85	<u>DATE PLUGGING COMPLETED</u> 9-11-85	<u>DEPT. REPRESENTATIVE(S) WHO ISSUED PERMIT OR APPROVED</u> Mike Moss	

## CASING RECORD

SIZE CASING	DEPTH SET	AMOUNT RECOVERED	SHOT OR RIPPED
13 3/8"	905'	--	--
9 5/8"	5575'	--	--

## BRIDGES OR PLUGS

[illegible]

Were tools, tubing, casing, etc., lost or left in the hole before or during plugging?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	If yes, give details:
Did a Service Company pump mud, spot cement, or set bridge plugs?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	If yes, give name and address: <u>Halliburton</u>
Was the well plugged by a Company or Contractor other than Owner or Operator?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	If yes, give name and address:
Representatives of Owner, Operator, Company, or Contractor who witnessed plugging:	<u>Slim Cookingham</u>	

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

Plugged on 7-6-84 partially as follows: 100 sx @ 8118', 365 sx @ 7823', 200 sx @ 6000'

Plugged on 9-11-85 as follows: HOWCO Lite, spot 175 sacks, plugs @ 5411', 4571', 3731',  
2891', 2051'

HOWCO Lite, 130 sx @ 1211'


Common 110 sx @ 636', 325'.

Cut off 9 5/8" wellhead 3' below ground and cap 9 5/8" casing.

(USE REVERSE SIDE IF NEEDED)

## CERTIFICATION

"I state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction, and that the facts stated herein are true, correct and complete to the best of my knowledge."

NAME AND TITLE (Typed or Printed) Donald P. Smith		COMPANY NAME AND ADDRESS PPG Oil & Gas Co., Inc. 2258 Enterprise Drive Mt. Pleasant, MI 48858
SIGNATURE 	DATE (Month, Day, Year) 9-24-85	





PPG Industries, Inc. 2258 Enterprise Drive Mt. Pleasant, Michigan 48858 (517) 773-3949

September 26, 1985

Mineral Well Supervisor  
Geological Survey Division  
Michigan Department of Natural Resources  
P. O. Box 30028  
Lansing, MI 48909

Gentlemen:


Enclosed is the Well Plugging Record, Form 7213 for the Johnson 1-1, 2-1 and 3-1.

Upon receipt, please sign below and return one copy to our office. Should you have any questions, or if I can be of assistance, please feel free to contact me.

Sincerely,

  
Janet Caltrider

Operations Staff Assistant  
Enclosure

Received on 9/30, 1985, by 



STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

MINERAL WELL PLUGGING RECORD

File in DUPLICATE Within 30 Days After Plugging is Completed

TEMPORARILY ABANDONED

PERMIT NUMBER

377-844-754

DATE

7/30/84

OWNER OR OPERATOR

PPG Oil & Gas Co., Inc.

ADDRESS

2258 Enterprise Drive, Mt. Pleasant, MI 48858

WELL NAME

Johnson

WELL NUMBER

3-1

WELL LOCATION

NW 1/4 SE 1/4 NE 1/4 SEC. 1 T. 16N R. 9W

TOWNSHIP

Grant

COUNTY

Mecosta

TYPE OF WELL (Brine, Disposal, Storage, or Test)

Test Well

TOTAL DEPTH

8073

FORMATION

Niagaran

DATE PLUGGING STARTED

7-4-84

DATE PLUGGING COMPLETED

7-5-84

WAS PERMISSION OF DEPT. OF NATURAL RESOURCES  
OBTAINED BEFORE PLUGGING BEGAN?

☒ YES

☐ NO

NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING

CASING SIZE	WHERE SET	AMOUNT RECOVERED	SHOT OR RIPPED	TYPE OF BRIDGES OR PLUGS	DEPTH PLACED	NUMBER SACKS
13 3/8	905	None	----	Cement	8118	100 sx
9 5/8	5575	None	----	Cement	7823	365 sx
				Cement	6000	200 sx

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

Ran drill pipe open ended to 8118' and spotted 100 sx, pulled drill pipe to 7823'  
and spotted 365 sx, pulled drill pipe to 6000 and spotted 200 sx.

(USE REVERSE SIDE IF NEEDED)

Were tools, tubing, casing, etc., lost or left  
in the hole before or during plugging?

☐ YES

☒ NO

If yes, give details:

Did a Service Company pump mud,  
spot cement, or set bridge plugs?

☒ YES

☐ NO

If yes, give name and address:

Halliburton

Was the well plugged by a Company or  
Contractor other than Owner or Operator?

☐ YES

☒ NO

If yes, give name and address:

Representatives of Owner, Operator, Company, or Contractor who witnessed plugging

Marvin Wood

CERTIFICATE

I, William E. Booker of Strickler Geological Services, Inc. (company),  
state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction,  
and that the facts stated herein are true, correct and complete to the best of my knowledge.

SIGNATURE

ADDRESS

TITLE

*William E. Booker*

1425 S. Mission, Mt. Pleasant, MI

Geologist

FINAL INSPECTIONS

DEPARTMENT REPRESENTATIVE

DATE

DEPARTMENT REPRESENTATIVE

DATE

[illegible][illegible]

**MINERAL WELL COMPLETION REPORT**  
TO BE FILED WITH THE SUPERVISOR WITHIN 60 DAYS  
AFTER COMPLETION OF WELL (ACT 315 P.A. 1969)

SUBMIT IN  
TRIPLICATE

NAME OF OWNER OR OPERATOR PPG Oil & Gas Co., Inc.		ADDRESS OF OWNER OR OPERATOR 2258 Enterprise Drive Mt. Pleasant, MI 48858	
NAME OF DRILLING CONTRACTOR T. D. Provins Drilling Co.		ADDRESS OF DRILLING CONTRACTOR 2113 Enterprise Drive Mt. Pleasant, MI 48858	
WELL NAME Johnson	WELL NUMBER 3-1	PERMIT NUMBER 337-844-754	
LOCATION NW SE NE	SECTION 1	TWP 16N	RANGE 9W
TOWNSHIP Grant	COUNTY Mecosta		
FOOTAGE 1077 Ft from South Line and 1237 Ft from East Line of quarter section N or S E or W			
DATE DRILLING COMMENCED 6-3-84	DATE DRILLING COMPLETED 7-2-84	DATE WELL COMPLETED 7-2-84	TYPE OF WELL Abandoned Iest
FORMATION COMPLETED IN Niagaran	TOTAL DEPTH 8073	ELEVATION KB 1172.4	RT RF 1171.1 GN 1156.4
ROTARY TOOLS From 0 Feet to 8073 Feet		CABLE TOOLS From Feet to Feet	

**WELL CASING RECORD**

TUBING AND CASING DATA				CEMENTING DATA			PERFORATIONS OR OPEN HOLE		
SIZE	LB./FT.	GRADE	DEPTH	SACKS	TYPE	STAGING DEPTH(S)	NO. HOLES	FROM	TO
13 3/8"	54.5#	K-55	905	400	CL4	525 Lite	Surface and dropped back,	grouted w/	100 sx.
9 5/8"	129 Jts.	N-80	1st stage	900	sx				
	42.5#								
	10 Jts.	N-80	5575	2nd stage	1200	sx 3600			
	40#								

**WATER ZONES**

**WIRE LINE LOGS RUN**

FORMATION	FROM	TO	AMOUNT	SERVICE COMPANY	TYPE LOG	INTERVAL LOGGED	COPY TO SURVEY
(Fresh)							
				Schlumberger	LDT-CNL-GR	100 - 5578	Yes
						5520 - 8070	Yes

**FRACTURE OR ACID TREATMENT**

**SOLUTION MINING**

DATE	FROM	TO	QUANTITY	NAME AND NUMBER OF INJECTION AND TARGET WELL - DISTANCE APART
None				None

The information in and attached to this report is complete and correct.

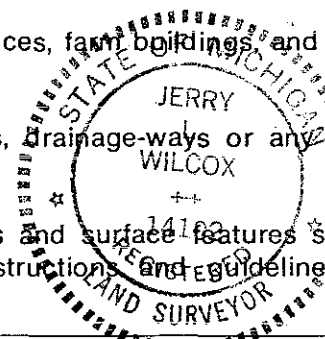
SIGNATURE <i>William E. Barker</i>	TITLE Geologist	DATE 7/30/84
GIVE COMPLETE FORMATION RECORD ON REVERSE SIDE		

# **SURVEY RECORD OF WELL LOCATION**

(Submit five copies with Application for Permit to Drill a Well for Oil or Gas,  
Brine Disposal, Hydrocarbon Storage or Secondary Recovery)

84024

LESSEE (OWNER OF LEASE RIGHTS) <b>PPG INDUSTRIES, INC.</b>			
LESSOR (OWNER OF MINERAL RIGHTS) <b>Don and Caroline Johnson</b>			WELL NO <b>3-1</b>
LOCATION NW ¼ OF SE ¼ OF NE FRC'L ¼ SECTION 1 T. 16 N R. 9 W			
TOWNSHIP <b>Grant</b>		COUNTY <b>Mecosta</b>	
PLAT BELOW REPRESENTS ONE FULL SECTION (1 Mile Square)		<p>1. Outline drilling unit and spot well location on plat at left. Where drilling unit crosses section lines, divide the plat into an east half and a west half <b>OR</b> a north half and a south half (which ever applies). Outline the unit and locate the well in two directions from <b>NEAREST</b> quarter section and unit lines.</p> <p>2. Location of well in two directions from <b>NEAREST</b> quarter section and unit lines is:</p> <p style="text-align: center;"><b>SURFACE LOCATION</b></p> <p><u>1077</u> ft from <u>South</u> line of Quarter Section <small>(north-south)</small></p> <p><u>1237</u> ft from <u>East</u> line of Quarter Section <small>(east-west)</small></p> <p>_____ ft. from _____ line of unit <small>(north-south)</small></p> <p>_____ ft. from _____ line of unit <small>(east-west)</small></p> <p>3. Describe wellsite marker. Show or describe access route if it is not readily accessible. Wellsite is marked with a painted wood stake. Site can be reached from the North off Balsam Road. See supplemental plat.</p> <p>Ground Elevation = <u>1156.4</u> feet, U.S.G.S. datum.</p>	
(Scale of Plat — 1 inch equals 1320 ft.)			
<p>4. ON SEPARATE PLAT OR PLOT PLAN:</p> <p>A. Locate, identify, and show distances to all roads, power lines, residences, farm buildings and other structures within 300 feet of the stake;</p> <p>B. Locate, identify, and show distances to all lakes, streams, swamps, drainage ways or any other surface water features within 1320 feet of the stake.</p> <p>5. In an ENVIRONMENTAL IMPACT ASSESSMENT describe all structures and surface features shown detailing plans for hazards prevention and erosion control (See instructions and guidelines for preparation of an environmental impact assessment).</p>			
NAME OF INDIVIDUAL WHO SURVEYED WELL SITE 		DATE <b>5-4-84</b>	TITLE <b>President</b>
ADDRESS <b>J. L. WILCOX &amp; ASSOCIATES, INC. 7230 North U.S.-131 Manton, Michigan 49663</b>			
I CERTIFY THE ABOVE INFORMATION IS COMPLETE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF			
SIGNATURE (LESSEE OR AUTHORIZED REPRESENTATIVE)	ADDRESS (IF DIFFERENT THAN LESSEE)	DATE (MONTH, DAY, YEAR)	



## Exhibit A

### Surface Casing (13-3/8" in 17-1/2" hole @ 900')

1. Use insert float and Texas Pattern Shoe and lock to shoe joint with thread lock.
2. No centralizers.
3. Circulate hole a minimum of one complete circulation.
4. Do not reciprocate casing.
5. Run bottom (red) wiper plug. Do not use if carrying L.C.M. in cement.
6. Pump 70 bbls. fresh water ahead of cement.
7. Cement with:
  - a. 475 sx. 50/50 Pox., 6% total gel, 3%  $\text{CaCl}_2$   
1.54 ft.<sup>3</sup>/sk., 13.3#/gal., 7.66 gals./sk.
  - b. 200 sx. Class A, 3%  $\text{CaCl}_2$   
1.18 ft.<sup>3</sup>/sk., 15.6#/gal., 7.66 gals./sk.

PPG INDUSTRIES, INC.

JOHNSON 3-1

MECOSTA COUNTY, MICHIGAN

PLAN VIEW  
1 IN. = 300 FT.

OBJECTIVE NO. 1:

1065' N35.59'E OF  
SURFACE LOCATION

7734' M.D. 7550' TVD.

862' NORTH 626' EAST

OBJECTIVE NO. 2:

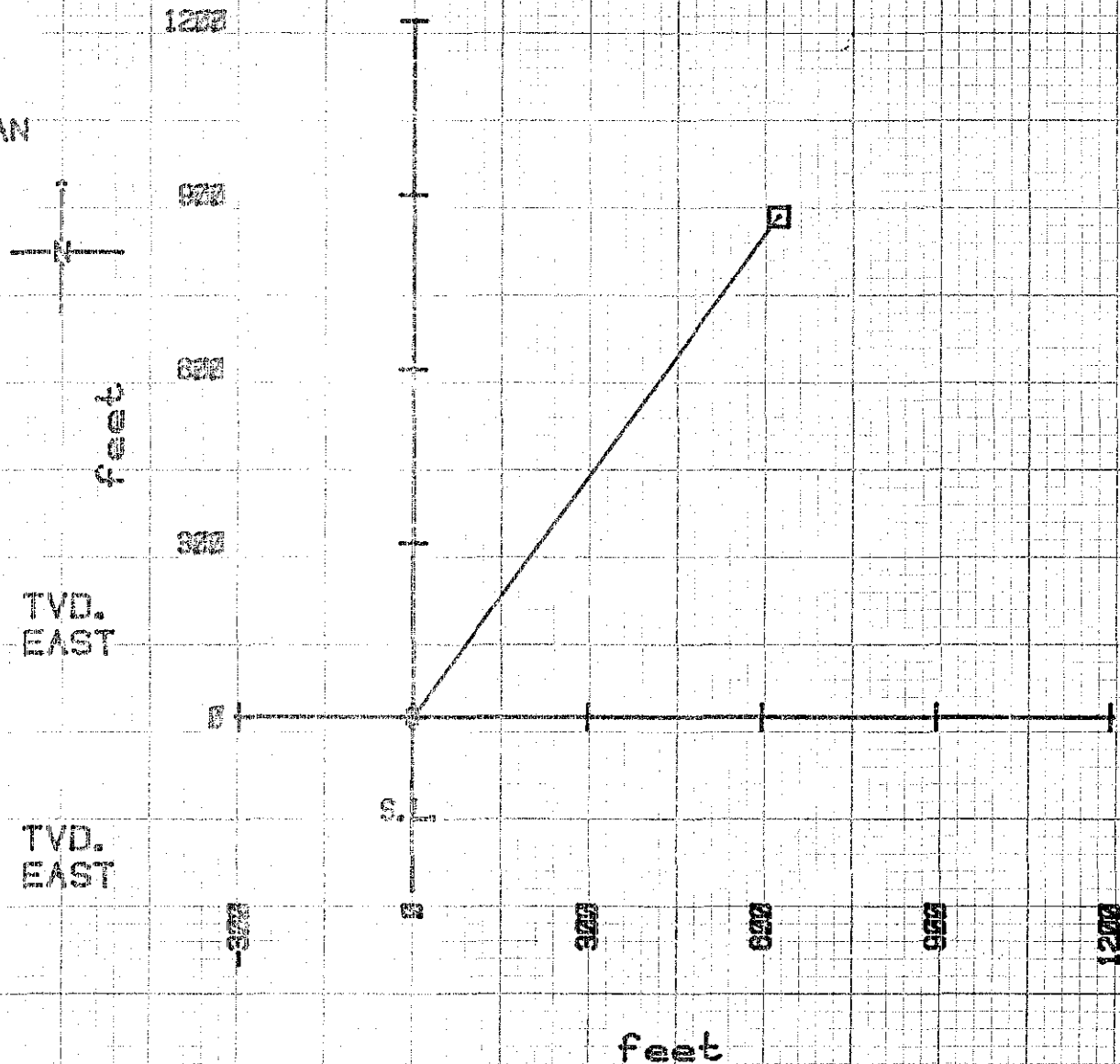
1065' N35.59'E OF  
SURFACE LOCATION

8234' M.D. 8050' TVD.

862' NORTH 626' EAST

SUBMITTED BY:

TRIPLE G DIRECTIONAL DRLLG.  
TRAVERSE CITY, MICHIGAN

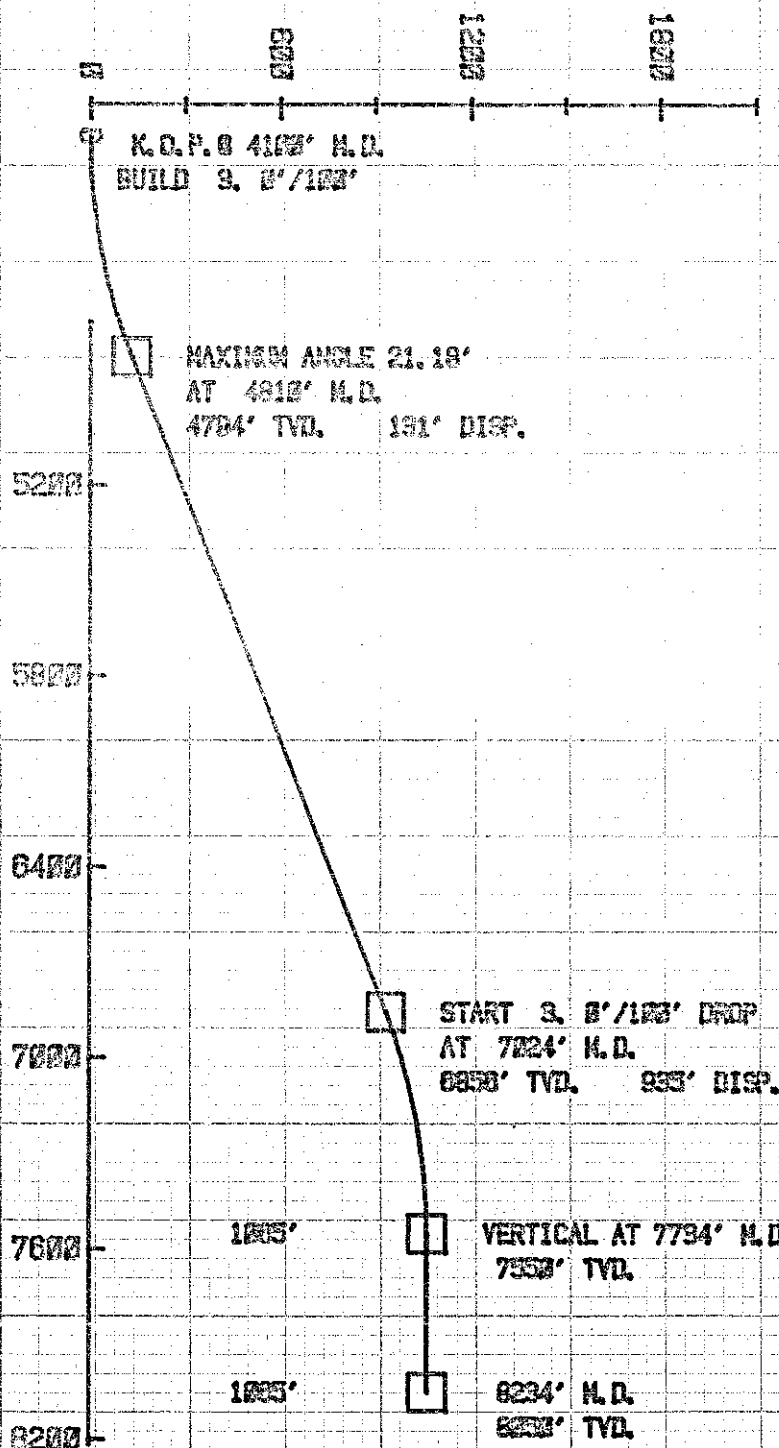


PPG INDUSTRIES, INC.  
JOHNSON 3-1  
MECOSTA COUNTY, MICHIGAN

VERTICAL SECTION 1 IN. = 600 FT.

feet

feet



SOUR GAS CONTINGENCY PLAN - PART II  
PPG - JOHNSON #3-1  
PAGE 2

NEAREST PUBLIC TELEPHONE

East 0.2 miles on Balsam Road; then North 3/4 of a mile on 120th Avenue; then West 1 1/2 miles on Schofield Road to 135th Avenue; Then North on 135th Avenue two miles; then West 4 1/2 miles on Hersey Road to the general store in the town of Hersey, on 180th Avenue. Phone is located in front of store.

MUD TREATMENT

A gas buster will be provided.

NOTE: For location of residences, public gathering places and evacuation routes, see vicinity map.



